STATE VITICULTURAL COMMISSION.

FIRST ANNUAL REPORT

OF THE

Board of State Viticultural Commissioners.

SAN FRANCISCO, CALIFORNIA:
EDWARD BOSQUI & CO., PRINTERS, COR. CLAY AND LEIDESDORFF STREETS.
1881.

OFFICERS AND MEMBERS.

ARPAD HARASZTHY, *President,*
Commissioner for the San Francisco District.

CHAS. A. WETMORE, *Vice-President,*
Commissioner for the State at Large.

CHAS. KRUG, *Treasurer,*
Commissioner for the Napa District.

I. DETURK, *Commissioner for the Sonoma District.*
R. B. BLOWERS, *Commissioner for the Sacramento District.*
GEO. WEST, *Commissioner for the San Joaquin District.*
L. J. ROSE, *Commissioner for the Los Angeles District.*
G. G. BLANCHARD, *Commissioner for the El Dorado District.*
J. DEBARTH SHORB, *Commissioner for the State at Large.*

DR. J. I. BLEASDALE, *Secretary.*

STANDING COMMITTEES.

Executive: CHAS. A. WETMORE, GEO. WEST, and I. DETURK.
Auditing: - - - - - - - R. B. BLOWERS.
Finance: - - - L. J. ROSE, and J. DEBARTH SHORB.

Phylloxera, Vine Pests and Diseases of the Vine:
I. DETURK, GEO. WEST, CHAS. KRUG, R. B. BLOWERS, and CHAS. A. WETMORE.

On Conference with Board of Regents of State University:
ARPAD HARASZTHY, CHAS. A. WETMORE and CHAS. KRUG.

Office of the Board:
No. 526 MONTGOMERY STREET, SAN FRANCISCO.

ACT OF THE LEGISLATURE.

CHAPTER LXII.

An Act for the Promotion of the Viticultural Industries of the State.

[Approved April 15th, 1880.]

The People of the State of California, represented in Senate and Assembly do enact as follows:

SECTION 1. There shall be appointed by the Governor a Board of State Viticultural Commissioners, to consist of nine members, two to be appointed from the State at large, and one to be appointed from each of the seven viticultural districts, which shall be constituted as follows:

First—The Sonoma District, which shall include the Counties of Sonoma, Marin, Lake, Mendocino, Humboldt, Del Norte, Trinity, and Siskiyou.

Second—The Napa District, which shall include the Counties of Napa, Solano, and Contra Costa.

Third—The San Francisco District, which shall include the City and County of San Francisco, and the Counties of San Mateo, Alameda, Santa Clara, Santa Cruz, San Benito and Monterey.

Fourth—The Los Angeles District, which shall include the Counties of Los Angeles, Ventura, Santa Barbara, San Luis Obispo, San Bernardino and San Diego.

Fifth—The Sacramento District, which shall include the Counties of Sacramento, Yolo, Sutter, Colusa, Butte, Tehama, and Shasta.

Sixth—The San Joaquin District, which shall include the Counties of San Joaquin, Stanislaus, Merced, Fresno, Tulare, and Kern.

Seventh—The El Dorado District, which shall include the Counties of El Dorado, Amador, Calaveras, Tuolumne, Mariposa, Placer, Nevada, Yuba, Sierra, Plumas, Lassen, Modoc, Alpine, Mono, and Inyo.

SEC. 2. The Commissioners, excepting the two appointed from the State at large, shall be residents of the districts from which they are appointed, and shall be specially qualified by practical experience and study in connection with the industries dependent upon the culture of the grapevine in this State. They shall each hold office for the term of four years, excepting that, of the nine first appointed, four, to be determined by lot, shall retire at the end of two years, when their successors shall be appointed by the Governor.

SEC. 3. The Board shall elect from among their own number a President, a Vice-President, and a Treasurer, and they shall appoint a Secretary, who shall not be one of their number, and whose salary shall not exceed one hundred dollars per

month. And the Board shall determine and fix the amount of bonds that shall be given by the Treasurer and Secretary for the faithful performance of their duties.

SEC. 4. It shall be the duty of the Board to meet semi-annually to consult and to adopt such measures as may best promote the progress of the viticultural industries of the State. It shall be their duty to select and appoint competent and qualified persons to deliver at least one lecture each year in each of the viticultural districts named in section one of this Act, for the purpose of illustrating practical viticultural topics, and imparting instruction in methods of culture, pruning, fertilizing, fermenting, distilling, and rectifying, treating diseases of the vine, raisin drying, etc., for the better instruction of the people interested therein, as the requirements of each district may show to be necessary and important, and to disseminate all such useful knowledge relating to viticulture by printed documents or correspondence as may be within their power to do. The Board shall devote especial attention to the study of the phylloxera and other diseases of the vine, and shall make such recommendations in their semi-annual reports as they may deem best for the protection of vineyards.

SEC. 5. The Commissioners constituting the Board shall serve without compensation, and shall be allowed only their actual transportation expenses to and from their places of residence when attending the semi-annual meetings of the Board.

SEC. 6. The office of the Board shall be in the City of San Francisco, and shall be kept open to the public, subject to the rules of the Board, every day, excepting legal holidays, and shall be in charge of the Secretary during the absence of the Board.

SEC. 7. It shall be the duty of the Secretary to attend all regular meetings of the Board, and to preserve records of proceedings and correspondence; to collect books, pamphlets, periodicals, and other documents containing valuable information relating to viticulture, and to preserve the same; to collect statistics and other information, showing the actual condition and progress of viticulture in this State and elsewhere; to collect information concerning lands suitable for viticulture, and to impart to the public, upon proper demands being made, information concerning the localities of such lands, prices, cost of cultivation, and means of transportation; *provided*, that he shall receive no fees for such services; to correspond with agricultural and viticultural societies, colleges, and schools of agriculture, and other persons and bodies, political or private, and disseminate information, printed or otherwise, as he may be directed by the Board of Commissioners; and to prepare, as required by the Board, semi-annual reports for publication.

SEC. 8. And for the further promotion of viticultural interests, it shall be the duty of the Board of Regents of the University of California to provide special instruction to be given by the Agricultural Department of the University in the arts and sciences pertaining to viticulture, the theory and practice of fomentation, distillation, and rectification, and the management of cellars, to be illustrated by practical experiments with appropriate apparatus; also, to direct the professor of Agriculture, or his assistant, to make personal examinations and reports upon the different sections of the State adapted to viticulture; to examine and report upon the woods of the State procurable for cooperage, and the best methods of treating the same; and to make analysis of soils, wines, brandies, and grapes, at the proper request of citi-

zens of the State; also, to prepare a comprehensive analysis of the various wines and spirits produced from grapes, showing their alcoholic strength and other properties, and especially any deleterious adulterations that may be discovered. The Regents shall also cause to be prepared, printed, and distributed to the public, quarterly reports of the Professor in charge of this work relating to experiments undertaken, scientific discoveries, the progress and treatment of the phylloxera and other diseases of the vine, and such other useful information as may be given for the better instruction of viticulturists.

SEC. 9. The Board of Regents of the University shall be authorized to receive and accept donations of lands suitable for experimental vineyards and stations, and shall submit in their next annual report an economical plan for conducting such vineyards, and for the propagation and distribution of specimens of all known and valuable varieties of grape vines.

SEC. 10. There is hereby appropriated, for the purposes mentioned in this Act, the sum of seven thousand dollars, to be apportioned as follows: For the necessary and contingent expenses of the Board of State Viticultural Commissioners, four thousand dollars, and for the University of California, three thousand dollars; and the State Controller shall draw his warrants upon the State Treasurer in favor of the Treasurers of the said Board of State Viticultural Commissioners, and of the University of California, for the amounts of four thousand and three thousand dollars respectively, as hereby appropriated, upon proper demand being made for the same; *provided*, that the said Board of State Viticultural Commissioners shall, in the month of December, submit to the Governor annual statements, duly verified by the oaths of the President and Treasurer, and attested by the Secretary of said Board, showing in detail the manner in which moneys received from the State have been expended, and also the amount remaining unexpended, together with an estimate of expenses for the ensuing year, beginning on the first day of July next thereafter.

SEC. 11. This Act shall take effect and be in force from and after its passage.

REPORT

OF

MR. ARPAD HARASZTHY, PRESIDENT OF THE BOARD

TO THE

GOVERNOR OF THE STATE OF CALIFORNIA.

SAN FRANCISCO, Dec. 28, 1880.

To His Excellency GEO. C. PERKINS,

Governor of the State of California:

SIR:— As President of the State Board of Viticultural Commissioners, and in accordance with an Act of the last Legislature passed for the promotion of the Viticultural Industries of the State, approved April 17th, 1880, I herewith submit for your Excellency's consideration the subjoined papers, being the result of the labors of the Board. These consist in the reports of the several Commissioners; the President's report; the Treasurer's report; the Secretary's report; the minutes of the Board's meetings; the reports of the various Committees; three Lectures given in three of the Viticultural districts, comprising a Lecture on the Phylloxera, a Lecture on the Curing of Raisins in Spain, and a Lecture on the Maintenance of our Vineyards; original papers on the manufacture and use of the Bi-Sulphide of Carbon in checking the ravages of the Phylloxera, and also several valuable translations from the French, accompanied with plates describing and illustrating the habits and ravages of the Phylloxera, the most dangerous pest the grape vine has ever known; a gifted translation from the French upon the mode of applying the Bi-Sulphide of Carbon, in ample detail; a translated treatise on pruning; and several other valuable papers, to all of which is added a colored map showing the present parts of the State as known to be infested with the Phylloxera, as discovered by the joint investigations of this Board and the State University. Special comments upon the labors of the individual Commissioners would seem unnecessary where the reports are submitted; such, however, is not the case, for no one can understand, without going over the work himself, item by item, how much time, labor and patience each Commissioner has had to undergo to collect the material he has presented: and it has all been a labor of love, without reward, other than the possible appreciation, at some future day, of his fellow citizens.

Among one of the first efforts of the Board was the attempt to gather directly from the vine grower in the State, correct information concerning the extent of his vineyard, his mode of culture, the varieties of the grapes planted, the disposal of his crop, etc., etc. Great pains were taken by the Committee to get up a detailed, easy and concise printed form for the purpose, which were then sent out by each of the Commissioners in their respective districts. The result was in each case the same, and is comprised in the following words of one of the Commissioners: "Either through a lack of interest therein, or a misapprehension of the aims and objects of the Commission, I have received but few responses." The Commissioners were therefore left to gather information as best they could, through personal interviews, and their power to accomplish their aim became very much restrained. The estimates made, however, are more correct than any heretofore gathered. But this work should be absolutely correct and complete in detail. Every vine grower's name in the State should be known, as well as the extent of his vineyard in vines and in acres; the age of his vines; the varieties planted; their respective yield; the pests and diseases that the vines are subject to; the cultivation, the pruning and general care, and finally the disposal of the product, either for market, raisins, wine or brandy. The Commissioners have spared no pains to gather all these points, so far as their time permitted, but they are busy men, one and all, and cannot devote *all* their time even in the public interest. The only way these important facts could be gathered, would be to empower the Board to engage the services of an expert at a fixed salary, who under their direction would visit every Viticultural District of the State, and make it his only duty to collect data, take observations, gather detailed statistics, and do such other work as the Board in its judgment might require to advance the vine growing interest of the State. The Commissioners are all willing to advise, to direct and give a certain amount of their valuable time for the promotion of the public good, but cannot afford to give all the personal work required to make this object complete. And the above plan is the only one in our opinion, by which enough valuable and reliable information can be gathered to disseminate among our Eastern citizens, and induce them to come and make their homes with us, to dot our plains and spot our hillsides with happy homes and thrifty villages.

One of the most important labors accomplished by the Board has been the discovery of the Phylloxera in Napa, Solano, Yolo, El Dorado and Placer, whereas before the Board began its labors, this fatal pest to the vine was considered to have existed only in the county of Sonoma. The danger is imminent; it is only through State legislation and assistance that the continued spread of its ravages can be checked, and one of the future grandest resources of the State be saved. The State legislation must be in the shape of quarantine laws, to prevent the transportation of vines that have not been disinfected, as well as to compel certain care in infected districts.

For more ample details on this head, I refer your Excellency to the exhaustive report of Mr. Charles A. Wetmore.

One of the most perplexing difficulties a new beginner encounters in planting out a vineyard is the selection of the proper vines—and the nomenclature in that respect in this State is sadly deficient, as it has ever been; almost in each district, often in the same township, the same vine is called by several contradictory names; hence the great difference in opinion of vine growers as to the respective qualities of various vines. To remedy this evil this State should have an experimental vineyard in an important vine-growing district, which vineyard should range in extent from 30 to 50 acres, where every variety of grape vine in the State should be planted in no less a number than one hundred vines, whose habits, growth, production and liability to disease would be carefully noted, and from which wine, brandy, raisins or fruit for market would be made as the quality would prove itself best adapted for; where seeds would be gathered and cuttings made for proper distribution to the public and in its interest: and thus, and only thus, could our nomenclature be satisfactorily settled and the comparative merits of the various varieties be definitely arrived at. This would be one of the greatest benefits that could be conferred upon the Viticultural pursuit of the State. Then California would not have the shame of going to borrow her required knowledge from Missouri, Ohio, France, Spain or Portugal, but would have knowledge of her own and to spare. Then we would not only know the vines that have been imported and acclimated with us, but would also know those that have grown beside our numerous water courses, on plain and amidst the mountain gorges, for ages past. Then the costly, tedious and unremunerative work of determining the qualities of the seedlings, cuttings and grafts of our wild vines would not be thrust unjustly upon the self-devotion and sacrifice of such men as Monsieur Mattier and Chas. A. Wetmore, but the State would deserve the credit that it had earned. This is what should be done. But will it be done? Even now I have warnings of a plan to have this Board, which has accomplished so much, as the subjoined documents show, merged into a gigantic other Board, whose interests are not in common with the Viticultural interest, and never can be so made; whose efforts would be ill placed and whose action would remain without fruit. What could be done where there are so many varied interests? Even were there one far-seeing, hard working vine grower in this huge Board, what could he do, even with autocratic powers, in his department? Could he be understood and the expenditures he advocated allowed among the indifferent and uninformed other members around him? I doubt it very much! I beg your Excellency to carefully compare the work of this Board, and then tell me if that work would have been complete without that of all the Commissioners joined to it? There is no single paper of this Report that could be considered complete of itself, nor could it be so in any combined general Agricultural Board, where the interests are

too varied, too numerous to result in any pointed, definite benefit. I trust, for the future welfare of the pursuit we represent, that your Excellency will not entertain the merging of this interest with any other. And it is with a certain degree of pride that I assert that this Board, in the last six months, has accomplished more good, collected more real, genuine facts, and in these reports disseminated more sound, practical, valuable knowledge for the promotion of Viticulture in California, than was done by all the Agricultural Societies of the State combined for the last twenty years; not that I desire to deny the beneficial effects of such Societies in their own understandings, but they have never harmonized with or understood the requirements of the Viticulture of California, and therefore have never done anything for it. In corroboration I will only refer your Excellency to their reports. Then compare the money they have had and the money we have had. And while on this subject, I will call your attention to the subjoined Report of the Treasurer, given in exact detail, showing a sum expended of $1,777 01, not including the printing and distribution of these documents, which will amount to about $900 more. There will then be left in the hands of the Treasurer the sum of $1,322 99, which has been appropriated as follows:

Salary of Secretary	$600 00
Office rent	240 00
Lectures, Commissioner's transportation costs, printing and incidentals	482 99
	$1,322 99

I beg to especially call your attention to the fact, that we have secured all our Lectures without cost other than hall rent and transportation fare, and also to the very moderate expenditures we have incurred, throughout. We, unfortunately, felt the need of stinting our expenses, our means being so very limited and our field so extended. Owing to this, we are now without maps, books or periodicals in our office, and when the Secretary, President, or any of the Commissioners, desire to make any references they have to seek information in the libraries of private individuals, instead of having their authorities at hand, as they should have them. The printing, too, of these documents has been reduced through necessity to one-half the contemplated number, thus greatly reducing the possible good of their free distribution. While as to the Phylloxera, they have been compelled to limit their labors to ascertaining its presence in certain districts without being able to conduct but one experiment towards effecting its extermination, though very many were suggested to the various Commissioners. In view, therefore, of the great interest at stake, and the necessity of prosecuting their labors to greater advantage, the Board have concluded to ask for an appropriation of ten thousand dollars a year for the following two years, and which it proposes to expend in the following manner yearly:

Secretary's salary, 12 months	$1,200 00
Practical Expert's salary, 12 months	2,000 00
Expert's fare for travelling	200 00
Office rent, gas and fuel, 12 months	550 00
Commissioners' travelling	200 00
Lectures and hall rent	450 00
Printing and mailing reports	1,800 00
Experiments against Phylloxera and Diseases of the Vine	3,000 00
Books and Maps for Library	400 00
Incidentals	200 00
Total	$10,000 00

And with this sum, with the power to engage a travelling expert, they expect to be able to do some effective work.

To note the necessity of using urgent measures against the Phylloxera, I have only to cite the following item from Mr. Wetmore's report, which shows the importation of foreign wine into Bordeaux, for

12 months in 1879..... 7,287,376 gallons.
9 months in 1880..... 14,652,000 "

The total importations into France this year will probably exceed one hundred million gallons; far in excess of total exportations.

And all of which is owing to the continued devastations of this pest, which in the past 8 years has destroyed one and a half million acres of French vineyards.

The amount of wine received at San Francisco from the interior was:

In 1880..... 3,759,743 gallons
In 1879..... 3,364,607 "

The amount of Brandy received was:

In 1880..... 133,764 gallons
In 1879..... 93,506 "

☞ Showing a very notable increase in the reception both of Wine and Brandy.

The shipments out of the State for 1880 of Wine were:

By sea..... 1,545,715 gallons.
By rail..... 941,638 "

Total..... 2,487,353 gallons.

In 1879 the total export of Wine was 2,155,944 gallons.

The shipments of Brandy for 1880 were:

By sea..... 97,533 gallons.
By rail..... 91,565 "

Total..... 189,098 gallons.

The total brandy shipments for 1880, showing an increase of 25,206 gallons over the shipments of 1879.

In round numbers, the vintage of 1880 has been estimated to range between ten and twelve million gallons. To arrive at a valuation, we will adopt the following figures:

9,500,000	gallons	dry wines, @ 25 c.,	$2,375,000
700,000	"	sweet wines, @ 60 c.,	420,000
450,000	"	Brandy (in bond) @$1.15,	517,500
		Total	3,312,500

To this should be added about $100,000 for value of raisins, and from 100 to 150 thousand dollars' worth of grapes, used for table use, preserving, etc., making the grand total value of the grape production of the State about $3,500,000 in the producers hands.

The plantation of new vineyards has taken a renewed life within the last two years, and, for the year 1880, the estimate has varied from eight to ten thousand acres for the State; this coming season, from all accounts, it may reach twenty thousand, for on every side we hear of plantations, and on the grandest scale.

From the interesting reports of Mr. Rose of the Los Angeles, and Mr. Blanchard of the El Dorado Viticultural Districts, we learn that good grape lands can be had for from ten to a hundred dollars per acre in the former, and from ten to thirty dollars per acre in the latter district.

One of the most encouraging features of all is, however, contained in Mr. De Turk's report, who represents the Sonoma District, and who reports that last year 2,000 acres of new vineyards were planted, which shows full well the confidence of the people of Sonoma in the future of this pursuit, in spite of the presence of the dreaded phylloxera. Mr. Geo. West, of the San Joaquin Viticultural District, in his very interesting report, containing tables of the rain-fall from 1871 to 1880, and a meteorological report for 1878–1879 and 1880, taken at Stockton, also states that land can be had in San Joaquin County at from $25 to $125 per acre, the best price being that paid for land close to the City of Stockton; $15 to $50 in Stanislaus County, and $5 to $50 in Fresno County; while he puts the production, without irrigation, at from five to ten tons per acre. To this he adds that wine grapes sold this year from sixteen to thirty dollars per ton around Stockton. In Mr. Krug's report, who represents the Viticultural District of Napa, we note the most extraordinary increased production of wine within the past decade—the production being 297,670 gallons in 1870, and having risen to 2,460,000 gallons in 1880. In Mr. Wetmore's report we find, besides many practical and sound theoretical suggestions, a great amount of valuable and pertinent correspondence. But with these, he has, in a few words, drawn our attention to one of the most astounding, if not the most important, viticultural

discoveries made in this age. I allude to what is called the *Vine of Soudan*, said to have been discovered by the French botanist, Lécart, in the neighborhood of Koudian, in Africa. This vine is said to be an annual, springing from a bulbous root, and to whose flowers there succeeds sweet and exquisite fruits, and Mr. Lécart vouches that he had gathered and eaten its ftuit after ample verification of the above statements. It is my opinion that the State could hardly pay a sum that would be too large to secure a number of these vines. Especially in Southern California would this wonderful vine be more likely to yield its fruit and prove its true value.

In the report of Mr. Blowers, who represents the Viticultural District of Sacramento, we find one of the most valuable papers. It contains exactly the kind of practical knowledge that both small and great California raisin dryers have needed most ; in its clear, concise, practical instructions they will find the short cut to success. It is in making public such papers as these, and the Lecture on Raisin Making in Spain, by Mr. West, that the true value of this Commission is shown. Here in a few pages are embodied on the one hand, the experiments of eighteen years on the part of Mr. Blowers, and on the other hand, the carefully collected observations of Mr. West, in a land six thousand miles away, where raisins have been made a thousand years. From Mr. W. B. West's figures, it seems that in 1878 the United States imported and consumed $2,681,692 worth of currants and raisins. This was the amount used for forty million people ; what will it be when, in twenty-five years, we are eighty millions of people? As to our produetion this year, we may have produced a little over $150,000 worth. There is field yet for an increase, and especially in view of the lamentable ravages created in the raisin districts of Spain, through decay of the vines and the phylloxera.

In accordance with the act of the Legislature, one lecture is to be given in each of the seven viticultural districts of the State within the year, upon some practical subject. There have been three lectures given : one in the District of Sonoma, on the Phylloxera and the Vine Pests, by Dr. Behr ; one in the Sacramento District, on Raisin Making in Spain, by W. B. West, Esq.; and one in the Napa District, on the Maintenance of our Vineyards, by Professor Eugene W. Hilgard. These lectures all contain so much of value to this interest, that they have been added to our reports. In the following six months other lectures will be given in the remainder of the districts. To these reports have also been added valuable contributions upon the Histery of the Phylloxera in Sonoma Valley, by Mr. H. Appleton ; upon Carbon-Bisulphide for the Phylloxera, by J. H. Wheeler, Esq.; the History of the Orleans Vineyard, and its diseases, by J. Krauth ; a valuable translation from the French upon the Use of the Bi-Sulphide of Carbon for the Treatment of Vines, by Miss Anna Louise Wetmore ; a translation from the French of an excellent Treatise upon Vine Grafting, accompanied by numerous illustrated wood cuts ; a valuable translation describing minutely,

the Life, Growth, Transformations, Habits and Ravages of the Phylloxera, also containing numerous engravings; a map of California, delineating in colors, the districts where the Board of Commissioners have discovered the presence of the phylloxera, and a number of other very valuable papers. But one of the most important of all the works of the Board has been the encouragement it has given to the establishment of a factory for the production of the Bi-Sulphide of Carbon at Berkeley, and which material is practically to be furnished at near cost price, 8 cents a pound, thereby rendering it possible to stamp out the phylloxera from among us, and save our vineyards and their productions. I cannot say too much in praise of this factory, which is likely to save millions of dollars to the citizens of this State.

The documents which your Excellency will find joined hereto, comprise in resume, the labors of this Board of Viticultural Commissioners for the first six months of its organizatlon. From these you will see that a vineyard can be planted and maintained till its first year of production for less than $75 dollars per acre; and that good land upon which to plant, can be purchased at from $10 per acre, upwards; and it will be further seen that the nett yield in coin to the producer this year has not been less than $50, and and that the greater number has reached $100 per acre. In view, therefore, of the great advantages of viticulture in rendering valuable our millions of acres of now barren hillsides; of rendering productive in grapes and raisins our exhausted grain fields, which now barely pay for the seeding; in view of the advantages this pursuit offers to people of limited means to secure homes and an unfailing sustenance; in view of the enormous wealth the future exportation of our viticultural productions would bring to our golden shores, and populating our State with healthy, frugal, thrifty citizens; in view of all this, I beg of your Excellency to use your great personal influence and powerful recommendation towards securing for the use of this Board, the most liberal appropriation possible.

I have the honor to remain, very respectfully yours,

ARPAD HARASZTHY,

President State Board Viticultural Commissioners.

REPORT OF MR. CHARLES KRUG, TREASURER.

ST. HELENA, NAPA CO., CAL., Dec. 31st, 1880.

To the Board of State Viticultural Commissioners:

GENTLEMEN: I respectfully submit the following Report, showing the receipts and disbursements of my office as Treasurer of your Board, from the time I entered upon the duties of my office until the date hereof.

I. RECEIPTS:

From the State Treasurer, (being the full amount appropriated for the use of the Board by the Act providing for its organization) $4,000

II. DISBURSEMENTS:

1880.		No. of Warrant.		
July	1.	1.	J. I. Bleasdale, Secretary, May 25—June 30	122 96
"	14.	2.	N. H. Eaton, rent, July	40 00
"	20.	3.	Chas. A. Wetmore, for Davis Bros., waste paper box, etc.	6 00
"	26.	4.	H. S. Crocker & Co., books, printing matter, etc ..	72 05
Aug.	5.	5.	F. G. Edwards, carpets and door mats	90 90
"	18.	7.	A. Wasson, sign painter	17 10
"	18.	8.	J. G. Allen, short hand reporter	41 50
"	27.	9.	I. de Turk, President Phylloxera Committee	150 00
"	27.	10.	C. A. Wetmore, ordered by Board for Executive Committee.....	50 00
"	30.	11.	N. H. Eaton, rent, August	40 00
Sept.	6.	13.	N. H. Eaton, rent, September	40 00
"	6.	14.	N. P. Cole & Co., furniture.....	190 00
"	7.	6.	J. I. Bleasdale, Secretary, July.....	100 00
"	7.	12.	J. I. Bleasdale, Secretary, August	100 00
"	30.	16.	J. I. Bleasdale, Secretary, September	100 00
Oct.	1.	15.	N. H. Eaton, rent, October.....	40 00
Nov.	1.	17.	J. I. Bleasdale, Secretary, October.....	100 00
"	15.	19.	Woodward & Co., (Alta), printing.....	118 43
"	15.	20.	Gregory & Co., ...	16 00
Dec.	1.	21.	J. I. Bleasdale, Secretary, November	100 00
"	9,	18.	N. H. Eaton, rent, November.....	40 00
"	9.	22.	N. H. Eaton, rent, December.....	40 00
"	16.	23.	I. de Turk, Pylloxera Committee, balance	62 07
"	30.	27.	J. I. Bleasdale, Secretary, December	100 00
				$1,777 01
			Balance unexpended.....	2,222 99
				$4,000 00

CHARLES KRUG,
Treasurer.

N. B.—The sworn statement of expenditures, as required by law, has been submitted to the Governor, corresponding with the foregoing reports.

REPORTS

TO THE

Board of State Viticultural Commissioners,

MADE BY THE

MEMBERS OF THE BOARD.

FOR THE YEAR 1880.

Report of Mr. I. DeTurk, Commissioner for Sonoma District.

Sonoma Viticultural District,
Santa Rosa, Dec. 10th, 1880.

To the Board of State Viticultural Commissioners:

The undersigned, Viticultural Commissioner for Sonoma District, including the counties of Sonoma, Marin, Lake, Mendocino, Humboldt, Del Norte, Trinity and Siskiyou, herewith submits a report of the grape growing interest of said District, and the official duties performed as such Commissioner from the date of the organization of the Commission.

I called a meeting of the grape growers of this District, which met in the town of Sonoma on the 23d of July, which was well attended by grape growers from this and the Napa District, and by many others from the State at large. Important investigations were made in regard to the habit and extent of the phylloxera, and a number of instructive and interesting lectures were delivered. The transactions of this meeting will appear at length in the general report of the Commission.

On or about the first of August I addressed a circular letter to each of the Assessors in this District, requesting statistics of the grape interests in their respective counties. The replies received indicate that in the counties of Marin, Mendocino, Humboldt, Siskiyou, Trinity, Del Norte and Lake, the grape is not cultivated to any extent worthy of mention at this time. I am, however, of the opinion that the soil and climate of Lake county are well adapted for grape culture, and that it offers an inviting field for grape growers.

In Sonoma County there is a large and rapidly increasing grape interest. I addressed circular letters to a great number of grape growers with the request that they would furnish statistics upon which I might base an estimate of the grape interest and wine product of Sonoma County. I regret to state that I have received few or no replies to these inquiries. My estimate may not therefore be as accurate as desired, but it will closely approximate the actual product. The whole of Sonoma County, except a narrow strip on the immediate coast, is well adapted to grape culture. From the southern to the northern extremity of the county the grape flourishes and good sound, saleable wine has been produced. A very interesting and successful experiment of William Bihler in lower Petaluma Valley, below Donahue Landing, has conclusively proven that the vine flourishes on the level with tide-water as well as upon the red volcanic soil of the interior up-lands. In view of Mr. Bihler's success, it may be justly claimed that the grape district of Sonoma County extends from the shore of the bay at San Pablo to Cloverdale, and from the summit of the Mayacmas Range, the eastern boundary of the county, to within ten miles of the sea coast, a length of territory of sixty miles and a breadth of twenty-five on the average. Within this area, there is great variety of soil and marked climatic dif-

ferences, producing wine uniformly good, but varying in essential qualities and in the delicacy of its color and bouquet. There are in the county about 7,000 acres of bearing vines, and at least 3,000 not yet bearing, of which 2,000 acres have been set during the past year.

From the best information that can now be obtained, I estimate the wine product of this county for the year 1880, as follows:

Sonoma Valley	1,400,000	galls.
Guillicos	150,000	"
Bennett Valley	100,000	"
Santa Rosa	200,000	"
Windsor	75,000	"
Knight's Valley	25,000	"
Sebastapol	20,000	"
Healdsburg	150,000	"
Geyserville	40,000	"
Cloverdale	30,000	"
Total	2,180,000	"

While there has been much damage by the phylloxera in some vineyards in Sonoma Valley, it is gratifying to note that there is an unusual product of wine for the year, and I am convinced that to this date it has proved fatal only on the shallowest soil in that locality. A careful examination has satisfied me that the insect has not appeared any where in this county outside of Sonoma Valley proper, and there the extent of the injury, as proven by this year's product, is much less than heretofore supposed.

Any attempt to give the varieties of grapes grown in this county, in the confused condition of grape nomenclature, would be useless. The old vineyards are mostly of the Mission variety, while those more recently set out are in the main the Zinfandel, Reisslings, Golden Chasselas, Traminer, Burger, Flame Tokay, and other popular foreign varieties. It may not be out of place to say that the subject of grape nomenclature is important and worthy of the attention of this Commission. If the varieties of grapes grown in this State were classified and named, it would be of great advantage to grape growers.

I received in June last a request from the Secretary of the Commission to procure official maps of each county in my District, with which I am unable to comply, for the reason that no official map exists in any of these counties.

Respectfully submitted,

I. DE TURK,

Commissioner for Sonoma District.

Report of Mr. Arpad Haraszthy, Commissioner for the San Francisco District.

San Francisco Viticultural District,
San Francisco, Dec. 13, 1880.

To the Commissioners of the State Board of Viticulture:

Gentlemen: Having the honor to represent the Viticultural District of San Francisco, I submit for your consideration the following report:

This viticultural district comprises the counties of San Francisco, San Mateo, Alameda, Santa Clara, Santa Cruz, San Benito and Monterey.

The number of vines planted in each county, as near as could be ascertained from reliable local sources, are as follows:

San Francisco	none reported.
San Mateo	225 acres.
Alameda	540 "
Santa Clara	1,451 "
Santa Cruz	430 "
San Benito	315 "
Monterey (estimated)	100 "
Total	3,061 acres.

The greater part, say nine-tenths of the above, are in full bearing. In this whole district the imported grape vines are in the greatest number, the Mission grape being less than half, and possibly not over one quarter of all planted. It is too early in the season to ascertain definitely how much wine was made in each county, but the following figures, I think, will be very close to the actual production, making due allowance for grapes shipped for market purposes, in and out of the counties named:

San Francisco	250,000 gals
San Mateo	90,000 "
Alameda	270,000 "
Santa Clara	580,000 "
Santa Cruz	172,000 "
San Benito	60,000 "
Monterey	none reported
Total	1,422,000 gals

In the above estimate I have credited San Francisco with the manufacture of a quarter of a million gallons of wine, which, though a very large figure, I deem rather under than over the real amount made. There were enormous quantities of grapes sold this year to the smaller wine-makers of this city, who are mostly composed of French, Portuguese and Italians. These people, having a general knowledge of wine-making, as carried on in their own country, and looking upon wine as a necessity, each year manufacture enough, from grapes bought in the market, to supply their families, and often those of their friends, for the whole year. Their entire manufacturing apparatus would not cost a hundred dollars, and often not one-half of that amount. It usually consists of half a dozen or more of French claret casks, a couple of tubs to tread out the juice from the grape, a small lever press, or, possibly, a small cider press, if the wine-maker is ambitious and desires to be up to the times. And among this class of people all the members of the family drink wine—the father, mother, the boys, the girls, and down to the newly-weaned babe. Yet, strange to say, you never see any of these people reeling in the streets in drunkenness, lying in the gutters, or conducted to the station-house by a policeman. They have learned how to use wine from their very babyhood, and love it too well to abuse of it. In the above estimated production of wine, San Mateo county was credited with ninety thousand gallons, which were partly made in Alameda county, the grapes having been sent there for that purpose.

There were less grapes sent to the San Francisco market from this district this year than in any previous year proportionally to the amount raised; the reason being that there was a general good demand for grapes at high prices for wine-making in the near neighborhood of the vineyards.

The vintage has proved an excellent one, though at first there were serious doubts as to the sufficient maturity of the grapes, the season having been a late one, and continuing cold; finally, however, a warm spell set in at the most propitious moment, and soon dispelled all fears as to the non-maturity of the grape. The fermentation has been excellent throughout, and the color of the clarets owing to the predominence of the imported varieties of grapes, has turned out generally very fine in this district. The quality of the wines that have come under my observation, is all that could be desired at this period of their manufacture. The varieties preferred here for wine-making, are grapes belonging to the Burgundy species, such as the Pineau, the Charbonneau, the Grenache, Miller's Burgnndy, etc.; and if we are to judge from the quality of red wines produced from them, these grapes are possibly the best that could be planted in the counties of Santa Clara and Santa Cruz, where the peculiar soil brings out their characteristics in quite a remarkable degree. Beyond this, these grapes all maturing early, being excellent bearers, and giving a deep color to the claret they are made into, when properly handled, are just suited to the climate of these counties which is cold, and where therefore the vintage would necessarily be late. At this date Santa Clara and Santa Cruz counties can show wines which have no superiors in California, and it is my opinion, that in the near future this district wlll not only produce very large quantities of wine, but that it will produce some of the very finest wines that will be made in the State.

A number of vineyards in the district are severely suffering from a form of fungoid disease which checks the growth of the vine, causes it to languish and become unproductive. I have been kindly offered a lecture upon this and kindred diseases

by Mr. Justin P. Moore, and when the proper arrangements can be made for its delivery, it will be announced through the newspapers, with the day upon which it is to take place, and I trust that as many wine growers as possible will be present. The lecture will relate to the growth and appearance of fungus upon the vine, its effect, and the best known remedies against it.

The prices paid this last season for grapes in the district, has varied somewhat; those nearer the wine makers and their presses realizing the better price. But the average price was high throughout, varying from $18 to $25 per ton, and no great distinction being made in variety. There are only a few large wine making establishments in the district, the smaller ones being the rule. From all sources I hear of renewed confidence in this pursuit, which has not only proved quite satisfactory during the last two seasons, but also quite prosperous. There were a great many vines set out last year, though how many I could not gather, and this year the plantations will be even more considerable, there being a great general interest shown in the undertaking among all classes of people, and especially farmers.

The amounts of wine and brandy received into this district, and re-shipped during the past year, will appear in my report as President of this Board.

All of which I respectfully submit.

ARPAD HARASZTHY,
Commissioner of the Viticultural
District of San Francisco.

Report of Mr. George West, Commissioner for the San Joaquin District.

San Joaquin Viticultural District,
Stockton, Dec. 15th, 1880.

To the Board of State Viticultural Commissioners:

It is with regret that I am compelled to submit such a meagre report from the various counties comprising the San Joaquin District.

I sent circulars to nearly all the viticulturists of the district, but, either through a lack of interest therein, or a misapprehension of the aims and objects of this Commission, I have received but few responses. The territory embraced within the district is so extensive it was impossible, in person, to visit each locality, and the time that has elapsed since the close of the season has been so very brief as to render it difficult to obtain accurate statistics, even had all grape-growers heartily co-operated therein. I will, however, take up the several counties and submit such information in regard to each as I have been able to collect under very disadvantageous circumstances; premising that what has been said of San Joaquin county in particular, is applicable to the district generally.

Reports from Ezra Fiske, Joseph Putnam, Stephen Sanguinetti, T. S. Woods, A. T. Ayers, C. Von Deeten, P. Fitzgerald, W. B. West, Geo. S. Ladd, Dodge & West, and W. L. Overheizer, are herewith submitted:

SAN JOAQUIN COUNTY.

The land of this county is generally level, although the lower foot-hills of the Sierra Nevada infringe upon its eastern border. It is estimated to contain 900,000 acres, fully one-half of it suitable for the growth of the grape. The price of the best vine land varies from $25 to $125 per acre, the highest price being for land in the immediate vicinity of the city of Stockton. The general character of the soil is clay and sandy loams, underlaid with marl, the water coming within ten to twenty feet of the surface. Our lands are more productive and freer from vine pests than those of France, Spain, Portugal and Italy, formerly the favorite homes of the grape.

Most of the land can be irrigated or submerged either from natural or artificial sources. The San Joaquin, Tuolumne, Stanislaus, Calaveras and Mokelumne rivers and their numerous tributaries furnish unequalled natural supplies, while artesian wells have been successfully sunk to the depth of 900 and 1000 feet, at a cost of only two dollars per foot, affording an abundant supply of water for irrigating large areas of land.

So far, few viticulturists have deemed it necessary to resort to irrigation during the summer months, but a few have submerged their vineyards in the winter, thereby largely increasing their production.

The climate of this county, as shown by the following reports, seems particularly adapted to the growth and health of the vine. The northwest wind during the summer prevents mildew and sunburn. We seldom have late frosts, and never have had one which materially injured the crop. I have never seen a variety that would not ripen, and most varieties are fully matured by the middle of September or first of October, which gives ample time for wine-making.

The meteorological reports are kept at the C. P. R. R. depot, which is a one-story wooden building. The observations were taken at 2 P. M. daily.

METEOROLOGICAL REPORT,

For the seasons 1878, 1879 and 1880, as kept at the office of the Central Pacific Railroad at Stockton, Cal.

TEMPERATURE—FAHRENHEIT.

	1878.			1879.			1880.		
	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.
January	....	....	.....	59°	40°	49	61°	42°	52
February	....	....	.....	68	50	$62\frac{2}{10}$	59	46	$53\frac{2}{10}$
March	....	....	.....	84	54	$63\frac{1}{10}$	68	51	$57\frac{7}{10}$
April	....	....	.....	70	56	$64\frac{6}{10}$	73	52	60
May	....	....	.....	84	61	67	86	58	$68\frac{7}{10}$
June	....	....	.....	95	70	$84\frac{4}{10}$	85	70	$76\frac{8}{10}$
July	93°	65°	$86\frac{7}{10}$°	100	78	$86\frac{6}{10}$	95	77	$83\frac{7}{10}$
August	99	65	80	103	79	$88\frac{8}{10}$	85	70	$78\frac{2}{10}$
September	92	73	$82\frac{8}{10}$	98	71	$83\frac{1}{10}$	90	72	80
October	88	51	$73\frac{6}{10}$	88	63	$72\frac{9}{10}$	79	66	$73\frac{1}{10}$
November	69	54	$62\frac{7}{10}$	66	50	$58\frac{2}{10}$	71	47	$61\frac{1}{10}$
December	68	52	$58\frac{9}{10}$	61	46	$51\frac{7}{10}$	68	54	$59\frac{1}{10}$

RAIN-FALL,

for the seasons 1871 to 1880 as kept at the State Insane Asylum, Stockton, Cal.

	1871–2	1872–3	1873–4	1874–5	1875–6	1876–7	1877–8	1878–9	1879–80
Inches.	20.80	13.27	14.06	11.14	18.26	6.99	18.76	11.46	15.43

PRODUCTION.

Although the first planting of the vine in San Joaquin dates back to 1850, there are only about five hundred and fifty acres now in full bearing, all the energies of our farmers having been devoted to wheat culture, which brought the most immediate returns for the time and labor expended. To Captain C. M. Weber must be awarded the honor of planting the first grape-vines in this city or county, but many others soon after followed his laudable example. Vines in full bearing produce from five to ten tons per acre, and about one-fourth of this product is shipped to San Francisco for table use, where those grapes always command the highest market price.

Wine grapes sold this year for from sixteen and one-half to thirty dollars per ton, and have paid the producer from fifty to one hundred and fifty dollars per acre, the cost of producing the same not exceeding ten dollars per acre for cultivation and one dollar to one dollar and fifty cents per ton for gathering. The demand for wine and brandy has increased, and the price advanced during the past year. I think no other production of our soil is so certain to afford remunerative returns, for, during an experience of twenty-five years, I have never known a failure of the grape as a paying crop.

WINES AND BRANDIES.

The prejudice that has heretofore existed against California wines arose, in a great measure, from the fact that most of the early vignerons planted the Mission grape, from which they made heavy white and red wines, which they put on the market when young and unfit for use. We find by experience that the Mission grape develops a marked sherry flavor after the fourth and fifth years, and that it is better suited for port, sherry and brandy, and that the lighter wines must be made from the Zinfandel, Riesling, White Nice, Berger, Frontignan and similar grapes, which wines contain less spirit. The quality of the wines and brandies made in this county is steadily improving each year, as the manufacturers become more familiar with the various processes and with the best methods of treating the different kinds of wine.

The varieties preferred for raisins are the seedless Sultana and Muscat Gordo Blanco, which make fine, high-flavored raisins and produce large crops. For table use the Black Prince, Flame Tokay, Muscat of Alexandria, Black Ferrar, and Emperor are planted, the first named being considered the most profitable, and is largely planted in this county.

DISEASES.

Red Leaf—So long known in France, where it is considered comparatively harmless, has been noticed in our vineyards for many years, but it has done little damage until this season. A liberal use of sulphur in June will check the disease, although the French wine-growers report lime as the best remedy.

Mildew (Oidium Tuckeri)—This disease, well known to all vine-growers, is easily prevented by the use of sulphur in quantities of 40 to 50 pounds per acre.

Black Knot—This disease has been known in our vineyards for fifteen years, and has done but little damage. I believe it is caused by short pruning or late frosts. It seems to affect the Black Prince more than any other variety.

The Thrip or Vine Hopper is the most troublesome of all the pests that infect the vineyards of this district, and it has been a well-known parasite since our vines were first planted. Six years ago they were very numerous. The past season they again appeared and did considerable damage. I have tried sprinkling the vines with powdered sulphur and lime, and used Buhack *(pyrethreum cinerariae folium)* both in powder and solution, but found the latter too expensive. Have built fires in the vineyard at night, and although many of the full-grown insects were killed, there were enough small ones and eggs to supply the stock. So far I have found nothing practical that would destroy them except pasturing sheep in the vineyard after gathering the crop. Sheep eat the leaves, and thus destroy the eggs. Raking up and burning the leaves and weeds, thus destroying their harboring places, in connection with early plowing and thorough cultivation, will keep the pest within bounds.

Another pest which I would warn vine-growers against, is the Convolvulus, or, wild Morning Glory. To young vines it is especially dangerous, and great care should be taken to destroy it when it first appears, as, when it obtains a firm foothold in rich, sedimentary soils, it is almost impossible to eradicate it. The only effectual means of destroying it is by thorough and continuous cultivation.

STANISLAUS COUNTY.

Stanislaus, like San Joaquin, is nearly level or slightly rolling land, except upon its eastern border. It contains 800,000 acres, a large portion of it good vineyard land. I have no means of determining the exact acreage in vines, but estimate it at 300 acres. The grapes grown compare favorably with those of other localities, the largest vineyards being in and around Knight's Ferry. Good grape lands are worth $15 to $50 per acre, according to location and easy access to market. Nearly all the vineyards are irrigated by means of ditches or canals. H. B. Peutland, of Knight's Ferry, reports 25 to 30 acres in vines, and large quantities of suitable land in that vicinity. All varieties do well when irrigated, and no disease trouble their vines. Joseph Domminier and V. E. Bangs report the same in substance except that they do not irrigate. Their reports are appended hereto.

I have received a full report from Mr. H. R. Shell, manager of the Red Mountain Vineyard. This vineyard contains seventy acres, two-thirds of which are of Mission, the remainder of Muscat and Zinfandel, all producing large crops. Large quantities of land with good facilities for irrigation can be bought in his locality for from $10 to $20 per acre. The grapes ripen early and are seldom injured by late frosts. He recommends pasturing sheep in the vineyard to keep down insects especially the vine hopper.

FRESNO COUNTY.

This is one of the largest counties in the State, embracing an area of 5,200,000 acres, mostly a sandy loam, a large portion of it arable, and at least 800 acres in

vines. The natural facilities for irrigation are numerous and excellent, and artesian wells bored to the depth of 150 to 300 feet, in many places, supplement the water supply. A great number of colonies dot the county with settlements devoted to fruit and grape culture, the central colony being especially devoted to raisin culture; all irrigate, and the industry promises great developments in the near future.

F. T. Eisen presents a very full and interesting report, from which we learn that he commenced planting in 1873, and now has 170 acres in bearing, mostly wine grapes, comprising the Zinfandel, Riesling, Hamburg, Malvoisia, Muscat, Feher Zagos varieties. T. C. White, of the Central Colony, has a vineyard of 30 acres, all of the Muscatella Gordo Blanco, and devoted exclusively to raisins. W. B. Banistor, Central Colony, has five acres in Muscatella. Miss M. F. Austin, manager of the Hedgerow Vineyard, Central Colony, cultivates 30 acres in Muscats, Gordo Blanco and Seedless Sultana. For more detailed statements I refer to the reports herewith submitted. Thousands of acres can be obtained in that vicinity at $5 to $50 per acre.

MERCED COUNTY.

In topography, soil and climate, Merced greatly resembles the counties above named. The area embraces 1,000,000 acres, nearly all susceptible of cultivation, and much of it adapted to the growth of the grape. The estimated number of acres devoted to its culture is about two hundred. No returns having been received, I am unable to report upon the present condition of this industry in Merced, Tulare and Kern counties, but hope to remedy this defect in the next annual report.

In conclusion, I would earnestly recommend the appointment of a State Entomologist, and the establishment of a Botanical Garden in connection with the Agricultural College of the State University. The Entomologist would be able to render invaluable services to fruit, vegetable, wheat and vine-growers, because new insects, diseases and fungi, injurious to vegetation, are being constantly discovered and remedies sought for those already known. In the Botanical Garden, trees, plants and vines of every variety could be collected, experimented with, and propagated for distribution throughout the State.

Respectfully,

GEO. WEST,

Commissioner for the San Joaquin Viticultural District.

Report of Mr. G. G. Blanchard, Commissioner for the El Dorado District.

EL DORADO VITICULTURAL DISTRICT.

PLACERVILLE, December 18, 1880.

To the Board of State Viticultural Commissioners:

In submitting my report, as Commissioner of the El Dorado Viticultural District, as an apology for its meagerness I call attention to the fact that my district

comprises fifteen counties, the most inaccessible in the State; with Modoc and Lassen on the north, Mariposa on the south, and Mono on the east, comprising almost the entire Sierra Nevada range of the State.

The soils of this District are nearly the same—what may be classed as second and third rate in excellence. The eastern portion of all the counties in my district, embracing more than one-half of the area, is unfitted for the vine from climatic disabilities; but the western portion of all these counties, or what is commonly known as the "Foot-hills," is particularly adapted to the vine. It varies from a gray sandy, a volcanic brick color, to a brown slaty, the shallowest being 2½ to 3 feet, the deepest 8 to 10 feet in depth.

In El Dorado county there are between eleven and twelve hundred acres now in bearing vines. The average number to the acre is 800. These produce on an average of two tons to the acre of grapes. The proportions and kinds growing—taking 100 as the sum—are as follows: Mission, or native grapes, 68; Catawba and Isabella, 10; White Muscat, Muscatella, Malaga, 6; Tokay, Black Morocco, Malvasias, 1; Zinfandel, Reisling, 2. The other 13 are made up of numerous other foreign varieties, such as Sweet Water, Black July, Hartford Prolific, Cloantha and Concord, and some others.

Very few vines have been planted in El Dorado county for the past five years, not to exceed 15,000 in all. The Mission, of the wine grapes, is the most prolific bearer. The number of gallons of wine produced will not fall short of 350,000; the number of gallons of brandy produced is about 150,000. There are from 75 to 150 tons of grapes used for raisins. They are usually dried by sun, some few by artificial heat. Grapes for wine sold at a uniform rate of $15.50 per ton, table grapes at from 3 to 8 cents per pound. The vine throughout the district is healthy and shows not its age. I regret to state that the investigations of Mr. Morse prove that our vines upon shallow, clayey, adobe and black soils are infested with phylloxera. but to no considerable extent—in fact the presence of this pest is barely noticeable.

In Nevada, Placer, Amador, Calaveras, Tuolumne and Mariposa counties the country conditions of soil and climate are about the same as El Dorado, yet these counties have not given the attention to the growth of the vine that El Dorado has. In Nevada county I am able only to approximate the actual state of things. The number of acres of vines, taking small with larger growers, is about 400. In Placer there are about 850 to 900 acres; in Amador county, about 600 acres; in Calaveras, about 400 acres; in Tuolumne, about 400 acres; Mariposa, about 500 acres, as near as I can learn.

The varieties of vines raised in these counties are about the same as in El Dorado, as well the average yield, and the amount of wine and brandy made is about in the same proportion to the number of acres planted as in El Dorado. The phylloxera has also made its appearance in the vineyards of Placer, Nevada, Amador and Calaveras. In Yuba, Sierra and Plumas I have no report, but am credibly informed that in each of these counties there are many of the healthiest vineyards in the State, though small in comparison. Inyo, Modoc, Mono, Alpine and Lassen have not given much attention to this industry, although the soil and climate of many portions of all of these latter counties are susceptible and fitted to vine-growing. There are in my district hundreds of thousands of acres of the very best vine-growing land in the State that can be had for the taking. Improved lands, in

bodies of from 100 to 300 acres, where from three-fourths to four-fifths of the whole are suitable for vineyards, can be purchased at from $10 to $30 per acre, in many cases with a vineyard of from five to ten acres already planted. The physical qualities of the soils exerted upon by the atmosphere above, subterranean water currents below, taken with the physical properties of the soils and its rich chemical constitution, from experiments already made, make the "foothills" comprising my district, with the cheapness of the lands, the most desirable and advantageous outlook for California's future vineyards. The foothill grape is said to have a super-abundance of sugar for a superior quality of wine, but this is shown to somewhat markets of the world, our grapes have commanded a better price and a readier sale, decrease with cultivation. Since California wines have taken a front place in the and very many hundreds of acres are now being planted. In this report it will be impossible for me to give the names of each vine-grower and his vine acreage, but I hope to be able to do so in a future report. It is desirable in the future, in planting vines in my district, to avoid shallow clay and bed-rock soils, to seek the sandy, porous, and easily pulverized ground, with the vine fair to sun during the whole day.

Upon the first appearance of disease, as colored leaves, leaf-dropping, stunted growth and dropping fruit, the vines should be eradicated from the soil and the place supplied with a hardy plant. If phylloxera has appeared, the work of extermination should commence at once. While analysis of crops made in Europe are uncertain guides, and even those of the Eastern States, or California, yet the experience of the French in vine culture, and cause of decay and remedy for vine disease, may be seized upon and applied to advantage here. The influences of season and climate in developing viticultural principles must be, of course, studied and applied here. Size of fruit, flavor, hardiness, thriftiness of growth, healthfulness, productiveness, and capability of resisting insect pests should mark the kind of vine to be welcomed as worthy of general cultivation. That such a vine can, by experiment, be discovered is highly probable.

GEO. G. BLANCHARD,
Commissioner for the El Dorado
Viticultural District.

Report of Mr. R. B. Blowers, Commissioner for the Sacramento District.

Sacramento Viticultural District,
Woodland, Dec. 11th, 1880.

To the Board of State Viticultural Commissioners:

Raisin making being one of the important interests in this "Viticultural District," I will explain the California method, the Spanish method having been ably described in the lecture of W. B. West, delivered during the last State Fair, being the annual lecture for the Sacramento Viticultural District, which will be found attached to this report. Raisins are made from the Muscatel Gordo Blanco

and Muscat of Alexandria, preferably of the former, also a seedless raisin, highly esteemed, made from the seedless Sultana. The grape should be allowed to remain on the vine until quite ripe, showing a yellowish or golden color and being more translucent than when too green. Then they should be carefully picked and placed upon a drying tray, (usually two by three feet in size) then exposed with an inclination toward the sun in some convenient place, generally between the rows in the vineyard or in some contiguous open land. After having been exposed a sufficient time to become about half dried, they are turned once in this manner, viz: two workmen taking an empty tray, place it upon a full one, holding them together firmly and with a swinging motion turn them over and replace the now turned grapes in their former position. The turning should be done before the dew is quite off the grapes in early morning; then when the grapes have become so dry as to lose their ashy appearance, some being a little too green, and some quite dry enough, they are, after removing those entirely too green, slid from the tray into large sweat boxes, having a thick sheet of paper between about every twenty-five or thirty pounds of raisins, then are removed to the storeroom, where they should remain two weeks or more. When ready to pack it will be found that the too moist ones have parted with their surplus moisture which has been absorbed by the stems and drier raisins. The stems are now tough and the raisins soft and ready to pack. They are carefully placed in packing frames made of iron or steel. The large and fair ones being placed carefully in the bottom of the frames, the surplus stems and imperfect berries cut away, then the average raisins are arranged in and weighed, placing five pounds in each frame, then pressed enough to make them firm in the frame, but not enough to break the skin. They are then passed to an inspector who examines the exposed side of the raisins, removing any imperfect ones, then placing the wrapper paper on the frame, holds it in place with a wooden or steel plate, turns it bottom up, drops the left end into the box, slides the plate quickly from under the frame and it drops into the box, then pressing slightly upon the moveable bottom of the frame, the frame is removed, the bottom of the frame is then pressed more firmly to cause the raisins to fill the space formerly occupied by the sides and ends of the frame; then it is removed and the face of the latter is exposed, all imperfect berries or too wet ones are removed and all vacancies or hollows filled by large, loose raisins. The label of the proprietor is then placed on the face; the ends of the wrapper, and then the sides are folded over, the box cover nailed on, and they are ready for market.

The complaint is sometimes made that the California raisins have too tough skins, too large and too many seeds, lose flavor in cooking, lose their bloom, and do not keep well. The most of these objections arise from an imperfect knowledge of the best varieties from which to make them. If Californians would confine themselves to varieties which centuries of experience have proved to be best in Europe, there would be more satisfaction in the result. Cultivation, irrigation, local climate, kind of soil, and exposure to sun, all have an influence in modifying the characteristics of any one variety. Virgin soil and vigor of vine may make the seeds fuller, as it does in all cereals, but it should not, other things being equal, make skins thicker, but the contrary.

Soil for raisins, a rich, sandy loam preferred; climate, warm; soil, moist;

winter irrigation in average years being quite as important as summer in our dry valleys. For safety against many kinds of insect pests, the phylloxera especially, a location is desirable where water is plenty and evenness of land surface permits winter submersion. In such favorable locations a larger berry, thinner skin, better yield, etc., will be the result, The vines are planted eight by eight feet in many locations, but growers of the greatest experience prefer a greater distance apart; some plant eight by ten feet, some ten by ten feet, thus giving greater vigor to each vine, enabling it to resist enemies of all kinds more surely.

Many hundred tons of shipping grapes are sent East from this district to all principal markets in the United States. The Emperor, Tokay, Black Morrocco and the Muscat family are most liked for the Eastern market.

Irrigation is a very important factor in the success of the fruit-grower, but if the situation is good in other respects, and no ditch water can be secured, it is found that in many parts of the State an unfailing supply lies but a small way beneath the surface in gravel ridges. Former water courses having been filled with gravel, the surface stream diverted sometimes many miles away, leave quite a large flow of water in the gravel. This being tapped by a well the only equipment needed is a straw-burner engine and rotary pump, and one hundred or more acres can be irrigated with economy, insuring a good profit and a pleasant home.

In an experiment made recently in Yolo county, after having submerged the entire vineyard for nearly two weeks, such a well being on the place, the ditch water was shut off from twenty acres of the vineyard, and while the water still covered the entire surface to the extent of over nineteen acres, the pump was run five hours, supplying the seepage and raising the water 5/8 of an inch over the entire surface, showing that in twenty-four hours three inches in excess of the seepage could be added to nineteen acres after the ground had been saturated.

Cost of planting and cultivating, irrigating, labor, subsistance, etc., including total expense for first year, is from $20 to $25 per acre, if thoroughly well done; second year, $15 to $20; third year many varieties, if well cared for, yield a profit; if not well attended to it may take a year or two longer. Nothing pays better than care, and nothing loses more surely than negligence in vine growing. In pruning, the habit of each variety grown, should be closely studied. In grafting, great care should be taken to choose stock with wood of similar growth; if the variety desired is a coarse wood and large grower, a similar stock should be selected; if wood is of fine texture and slow growth, a wood of fine texture should be selected as grafting stock. As fruit growing is destined to be the pursuit of a large portion of the agriculturists of this State, and their experience shows a yearly increase of insect pests, doing great damage to the various branches of the industry, a State entomologist, whose duty should be to study the habits of all injurious insects and assist in devising means for their extermination, seems to be an actual necessity; also the enactment of some law compelling those careless of their own interests to keep their fruit farms from breeding insects for the contagion of surrounding districts.

R. B. BLOWERS,

Commissioner for the Sacramento
Viticultural District.

ADDRESS DELIVERED BEFORE THE ANNUAL MEETING OF THE SACRAMENTO VITICULTURAL DISTRICT, AT SACRAMENTO, BY MR. W. B. WEST, ESQ., OF STOCKTON.

APPENDIX TO REPORT OF MR. R. B. BLOWERS.

RAISIN MAKING IN SPAIN.

At the annual meeting of the Sacramento District, called by me to be held at Sacramento during the time of the State Fair, the following address was delivered by Mr. W. B. West, of Stockton, a gentleman of long experience in viticulture in this State, who has studied raisin-making in Spain. Mr. West said:

LADIES AND GENTLEMEN:

Only a few years ago it was impossible to find any California raisins that were worthy of the name. We were groping in the dark; we knew nothing of the varieties to plant, how to cure them, or how to pack them. We knew nothing of localities suited to the raisin grape, and we had extravagant notions of the profits of the business.

All this has passed. We begin to understand the requirements of the business, and there were produced in this State in the year of 1879, at least 75,000 boxes of good marketable raisins. We have also learned that to succeed we must have knowledge, patience, energy and brains; that we must have the right kind of soil and climate for the true raisin grape; the Muscatella will not succeed everywhere, even in California.

Many who rushed into the making of raisins a few years ago, found that there was too much to learn, and gave it up after making a few tons of trash from all kinds of grapes, dried and packed in a slovenly manner. A few indomitable persons stuck to it; they had hard times; the price of foreign fruit was low; they had much to learn; but they persevered and are now nobly rewarded. They have taught us that only in certain localities can the business be carried on profitably. We are gaining information by these experiments every day, so that the future of raisin culture is more certain.

The California process will be given in the report of the Commissioner of this district, R. B. Blowers, who is amply able to do it justice, as he is one of the most successful producers in the State. To those who possess the required skill aud capital, the method of drying by artificial heat is of much value. But I believe in the future this business is destined to be carried on by small farmers. It is pre-eminently a matter of detail. It is such a business as will give employment to the family of the poor man; the one to make the little homestead in the hills a source of revenue.

To these the Spanish method is well adapted. I propose, therefore, in this paper, to give their methods of cultivation and preparation for market. From a people who have cultivated the grape and made raisins for many generations, we can certainly learn something especially as we are only beginners.

RAISIN MAKING IN SPAIN—PRICES AND CULTIVATION.

The raisin district of Malaga extends about seventy-five miles along the coast and six inland. In this little strip of territory are produced all the Muscatelle raisins of Europe, amounting at present to over 3,000,000 boxes per year. Not near all the land is devoted to raisins. Much of it is hilly and too dry and barren to produce anything. Some of it, like the Vega of Malaga, is planted with sugar cane. Oranges, lemons and bananas are grown on the terraced sides of the ravines, where irrigation can be commanded. The olive, fig, almond, caroba and prickly pear occupy some portion of almost every plantation. Many places are still unoccupied, the people seeming to want the enterprise or money to develope them.

In order to fully understand the matter, let us honestly compare our products with those of Malaga and see if we have anything to learn.

Our newspaper writers sometimes tell us that our raisins are at any rate equal, if not superior to those of Malaga. What are the facts? Our merchants (men of figures) tell us that our best brands are almost, but not quite equal to London Layers.

The following was the relative price of fruit at Malaga in August of 1878. It is the first cost in store—that is, the price paid to the producer, who only furnishes the fruit, the boxes and common paper, which has to be changed by the merchant.

There are five qualities better than London Layers, known as Nos. 1, 2, 3, 4 and 5. No. 1 rates at $4.50 per box; No. 2 at $3.75 per box; No. 3 at $3.25 per box; No. 4 at $2.50 per box; No. 5 at $1.75 per box; London Layers, $1.25 per box; Loose Muscatellas, $1.10; Layers. $1. The year 1878 was a year of unusual depression, the prices being at the lowest ebb.

The proportion of fruit better than London Layers, varies at different vineyards, so that I cannot give the estimate exactly, but in one instance, where the party was said to be skillful, and with honest packers, it was given as one-fifth. Thus, you see, that one-fifth of their fruit was better than any of ours, and that ours could be ranked as only sixth in quality there.

It is a fact that their fruit as it is put on the market is better than ours. The reason for this will be explained in due time. In the Spanish methods of planting and cultivation we have nothing to learn. The cost of labor in this country entirely shuts us out, if we were disposed to follow them. I will only state that all planting and cultivation is done by hand. For planting, large holes are dug, often three feet square and two or three feet deep. The whole vineyard is dug over twice a year with hoes, which cultivate it very thoroughly. The pruning also is very close, usually leaving only one eye. To this thorough cultivation and short pruning I attribute the high quality of their raisins. The average yield of their vineyards is quite small. At one place, where the raisins were very fine, the yield was only two pounds per vine. As there were 1,000 vines per acre the yield was only one ton; still it was called a profitable and valuable place. The yield on some hillside vineyards is even less than this, while on some valley land the vines will yield from five to ten pounds each.

THE SPANISH METHOD OF CURING.

In their mode of curing we may find something of advantage to us. As our grapes ripen nearly a month later than theirs we have trouble to get them dried, and have resorted to many expensive methods to accomplish this purpose.

Now, the climate in which the Spaniard cures his raisins in fifteen days is not any warmer than ours. It is a little more moist and somewhat varied by a shower; but his fruit being securely covered by boards remains perfectly safe, and by being covered at night to protect it from the dew, he is enabled to cure his raisins in the time stated, while we in California, who cure them on boards or canvas, are usually twice as long. I would, therefore, call your attention particularly to their drying floors, which will be described.

Their grapes commence to ripen by the 1st of August, and are usually gathered by the 15th of that month. They are not all picked at the same time, but only those that are perfectly ripe. Much judgment is required in this matter, as unless the grapes are perfectly ripe they will not make good raisins. They are picked from the vines very carefully, taking care to handle them by the stems, and are placed upon willow trays and carried to the drying-floors. In every subsequent operation care is taken not to disturb the bloom, which is very important to the higher grades.

We will now describe the drying-floors, which are constructed as follows: Where the country is a little hilly, as it usually is, advantage is taken of some slope with a southwestern aspect. When this is not obtainable, an artificial slope is sometimes made by building a strong wall for the back and sides and filling in with dirt. Sometimes they are perfectly level. They like to have them with such an inclination as will allow the water to run freely from the covers. The length of these floors, which depends upon the inclination of the land, is usually about 45 feet, where the angle is about 45 degrees. Where it is steeper they can be longer. The width is 14 feet. Between each bed is a path of three or more feet. Around the outside of these beds is a row of tile to prevent the water from entering from the paths. These are properly cemented, and it is very important that no water should enter. In the middle is a row of tile to support the centre of the covering, which is of boards 14 feet long by 1 foot wide. They are laid across the bed, and are lapped one over another, so that no rain can get in.

The bottom upon which the grapes are placed, is of the natural soil, and is always loose and dusty, the vineyardists contending that the dust rather protects, than disturbs, the bloom.

The grapes are placed quite closely upon this floor, but not so as to cover each other. Every one who has grown grapes knows that there is one side of a bunch of grapes that shows the stem more than the other. This side should be placed upwards.

The covers should not be placed on at night, until the grapes have shrivelled a little or in three or four days. At the end of eight days, if the weather is good they will require to be looked over, to take out such grapes as have dried in advance of the others, and these are clipped out with a pair of scissors. If allowed to remain they would become hard and worthless. A man commences at one end of the bed, and selects those that are dry, or nearly so, placing the remainder back just as they were before, not turning them over, as is the universal practice here. The reason for this is that the side cured on the ground, presents a more attractive appearance than the other.

At the end of the next seven days, the raisins are fully cured. Here let me state that no substance has been found that will cure a raisin so well as the ground, and no plan have I ever seen that seemed to me to be more fitted to accomplish the object sought than the Spanish sidehill drying floors.

Those made upon level ground require a few days more to cure the fruit, and are sometimes covered with cloth or corrugated iron. The superiority of this method over the ordinary California way of using boards or canvas is so marked that I hope some of our vineyardists will give it a trial. The necessity of covering fruit at night is not properly recognized in this State. I have found fruit in Spain warm and dry in the morning, whereas it would require at least two hours sun to bring it to that state had it not been covered. The covers also protect them from any showers that might come up during the drying season. They are also useful in retarding the drying, as it sometimes occurs that the raisins cannot be packed as fast as they dry.

ASSORTING AND PACKING RAISINS.

The assorting and packing comes next. The raisins are taken directly to the packing-house, and assorted and packed immediately for market, not going through any sweating process, which some of our people think necessary.

This sorting is of such a complicated nature, and requires so much skill, that it would be utterly impossible for us to follow it. They calculate that it requires a day's labor to select and pack a box of the best raisins. Another good reason is that the American market demands but few of the higher grades of fruit. The London Layers and loose Muscatellas are the most sought. As a full description of their modes of packing would take much time to go into detail, and be of no practical advantage, I will pass them with a few remarks.

The fruit is, as I said before, taken immediately to the place for assorting. A skillful workman takes each bunch in succession and grades them according to their size and condition. When a bunch contains two or more grades, as they usually do, it is cut up so that each can be put in its proper place.

Each kind is carried to the workman who is packing that particular class. Although the raisins never hold out to the weight which they are supposed to represent, I noticed the workmen were careful to weigh each form as they were put into the box. They are packed in forms of six pounds each, using common paper, which is replaced in the warehouses by a more fancy article, at the option of the purchaser. The loose Muscatellas are those single berries which may be on a bunch of superior class, which their strict grading requires to be cut out; hence they are usually of a better size than their price would seem to warrant.

FAULTS OF CALIFORNIA RAISINS.

I will mention some of the faults of our raisins. I do not take into consideration any of those products made from all kinds of grapes which are sometimes called raisins, but only those produced from the Muscatel.

FIRST.—They are not evenly dried, some of them being cured too much and others not enough. This can be obviated by going over them at the proper time, as mentioned before.

SECOND.—They are too small. Not enough attention is paid to pruning closely. They are not properly thinned when there is an overcrop. The practice of allowing a vine to produce fifty or sixty pounds is pernicious. Where the size of the berry is small do not allow it to bear so much another year. The Spaniards take off much

of their fruit. They even clip off a part of a bunch when they think it is too large. We had better have less berries, than such small ones.

It is sometimes urged that we cannot afford to take the pains that the people of Europe do; that labor is too high. It is to high for many of their operations, but at the same time it never pays to do work poorly. There is time wasted upon every farm, which, if properly applied, would go far towards making up the difference between European labor and ours. Our land can be worked at less expense by using horses to plow instead of hand labor. Our crops can be gathered at small expense, because we can use the wagon in the place of the hand-basket; surely we ought to be able to give our vines the proper pruning and thinning they need. Nevertheless, when we look back and see what a marked improvement there has been in our raisin interest during the past four years, we do not feel like finding fault with our pioneer raisin growers. They, like all others who have been connected with the grape interest, have had much to contend with.

THE SEEDLESS OR CURRANT GRAPE.

There is another class of fruit that is destined to be very prominent in our products. I refer to the seedless varieties of grapes. At present they have not been largely planted, nor have they been, as a rule, a success. I will describe the different varieties, and endeavor to show why they are not more successfully grown in this State.

The true currant of commerce, known as the Zante currant, is a black variety, very productive, but has never been grown successfully except on the Ionian Islands of Zante and Cephalonia and the southern coast of the Gulf of Corinth from Patras to Corinth. On the northern side of this gulf it is a partial or generally a total failure, as it is also in other islands near. In this State it has never been tried with the same treatment that it receives in the Morea; that is, flooded in the winter and pruned long, but it has usually been pruned like the Mission grape, and grown in vineyards with other varieties. We have, therefore, no right to say it cannot be grown profitably. The man who can grow the Zante currant successfully has a fortune. The white variety of currant is quite common here, but is too small and too poor a bearer to pay for cultivation. The Sultana is the most promising of all the seedless kinds. It is of good size, is productive, and finds a good market. It is bound to supersede the Muscatelle in many branches of cookery. I find that the demand increases in a greater ratio than the supply, which is at present limited. It did not attract much attention until last year, and consequently has not been planted largely. When its good qualities are known it will be planted extensively.

PROSPECTS FOR A FUTURE MARKET.

As the question of our ability to make raisins successfully has been fully answered by the amount and character of those put on the market last year, we will now consider the chances for a market.

I believe it is generally conceded that our products have quite shut out the foreign brands, except, perhaps, a few of the choicer grades. Our production more than equals the consumption; our vineyards are constantly increasing; the time has come when we have to seek other markets, where our fruit will come in direct competition with that of Malaga.

If we call our best raisins nearly equal to London Layers, our average would be about equal to Layers. The price of Malaga fruit has been very low since 1875, on account of the depression in business which naturally followed the close of the French and German war.

We quote, however, the price of Layers in the New York market: in 1875, $2.15 per box; in 1876, $1.90; in 1877, $1.60; in 1878, $1.85; in 1879, $1.65; in 1880, $2.25. It would be hardly right to estimate upon the average of these years, as some of them represent seasons of great depression. The vineyardists of Malaga complained greatly of the low price of their fruit, stating that the culture was not profitable; that a few years like 1877 and 1878 would bankrupt them. The phylloxera has commenced its ravages there, and as the vineyards are old and worn, most of them on the hillsides, we may soon expect to hear of a decrease of product and consequent rise of price. We may not be able to find a market in the Eastern and Middle States, as they are more exacting in quality, but in the Southern and Western States, and also in the Territories, our field is large.

I will not make any estimates upon the profits of the business. There are possibilities in the future beyond my foresight. Those who have made raisins know better what the cost of production is. The present railroad charges is 1½ cents per pound. I see no reason why they cannot be sold in the Chicago market with a profit to the producer.

In order to show the magnitude of the raisin business, I will give some statistics from official sources:

EXPORTS OF RAISINS FROM MALAGA TO THE UNITED STATES.

	Bxs.	Bbls.	60-lb. cs.	Value.
1869.....	1,343,005	25,552	20,134	
1871.....	1,227,323	650	26,175	$2,829,486
1874.....	1,197,533	586	32,086	2,202,637

ENTERED FOR CONSUMPTION.

	Lbs.	Value.
1876.....	32,221,065	$2,425,277
1877.....	32,419,637	1,109,334
1878.....	32,931,736	1,904,866

Duty, 2½ cents per pound.

CURRANTS.

	Lbs.	Value.
1876.....	20,911,061	$856,426
1877.....	17,152,664	749,488
1878.....	17,941,352	776,827

Duty, 1 cent per pound.

Report of Mr. L. J. Rose, Commissioner for the Los Angeles District.

Los Angeles Viticultural District,
San Gabriel, Dec. 9th, 1880.

To the Board of State Viticultural Commissioners:

It is a pleasing task to review the grape and wine industries of Los Angeles county for 1880. Crops have never been larger or of a better quality, and the demand for the grape by wine makers has been good, and continued so to the end. All parties concerned are satisfied, and contentment and plenty cheer the vigneron on to renewed effort for the coming year, which already is full of pleasing prospects. They are casting an agreeable shadow before through an abundant rain for the season thus far, and the viticulturist is now busy in pruning and saving cuttings for future planting. There will be more vines planted the coming season than ever before. There have already been 800,000 cuttings engaged at my place, and the demand for certain varieties is in excess of the supply.

It is now a proven fact that we, too, can make the finer qualities of light bodied pure wines. In former years Los Angeles had the reputation of being especially adapted for the making of Port, Angelica, Sweet Muscat and Brandy; but, in the making of light dry wines, the county stood last on the coast. The writer never shared in that belief; for, if the Mission grape attained a higher and more perfect maturity, and made a wine of the best quality for which it was adapted, I could not see why other varieties of grapes, which were suited for other kinds of wine, should not, also, when ripened in our genial, pleasant climate, make a wine—a light wine—characterized by a bouquet of the best quality. It is now an admitted fact that no country, no difference how well adapted for the growing of grapes of the best quality for the making of the most superior wines, will make equally good wine from all kinds of grapes. In order to make the best quality of wine, such localities must also have those varieties of grapes that make the best quality of wine. Johannisburg, without the Reisling, would soon lose its reputation for its fine quality of wine. Plant Chateau Lafitte with the Mission grape and the time would not be long when its name would drop out of existence as a locality for fine clarets. Of course locality, climate and other causes have a marked effect on the quality of wine, and all conditions must be favorable to make a wine of the first quality; but I mean to say that the variety has more influence than any one other condition.

Perhaps there is no locality in California which is so little understood as to its climate as Los Angeles and other southern counties. I am often met, when in Stockton, Sacramento and other places in the State, by the query, "Well, it must be very hot in your county now?" whereas the fact is that our summer heat is much less, and our nights are much cooler, than is the case at either place mentioned. We have but little hot weather, but a more even temperature, warmer

winters, and a longer season. As this is the home of the orange, lemon and other like fruits, the mistake is a natural one, but we excel in raising these, not because we have a greater summer heat, but because we have a warmer winter and a more even temperature for the whole year.

It is no longer an experiment whether we can make a light wine of the best quality. It is a fact accomplished—a fact which all viniculturists who have tried our wines, admit. I can show wine in quantities which only carries 7 per cent. of alcohol, and it can be drunk with pleasure when one is dry to quench thirst and leave no dullness of the mind behind. Of course, this cannot be done with the Mission grape, and the verdict founded on that grape has been a just one which said that we could not make a light wine, and that all our wines had a sherry flavor. The planting of other varieties of grapes, however, tells a different tale. The planting of Blaue Elben, Berger, Zinfandel and Charboneau, changes this verdict, which was based upon wine of every kind and variety made from our grape, viz., the Mission.

Our future, too, is brightening in other ways. We will soon have a transcontinental railroad, with several arms reaching to every part of our continent, and will not be handicapped by having to send our product to San Francisco before we can begin our shipment to the Eastern cities. This was a heavy burthen to the wine interest. We can now fairly claim that this district has advantages abreast, at least, with the most favored in California, in all respects, and it will be excusable in us if we show ourselves to be a little over jubilant for good taste, and indulge a little too freely in California boasting. We really have something to be proud of.

Little can be said by me of any other counties in my district in this report to you except as to Los Angeles and San Bernardino counties, for these two counties now have at least nine out of every ten acres of vineyards in this district. I have sent our printed form of questions to all the counties to different parties, but none have favored me with a reply excepting Dr. W. F. Edgar, of San Bernardino, whose reply is here before you. I have, too, applied to all the different County Clerks for maps of their respective counties, but such maps have not been sent me, perhaps for the reason that there are none. The only one which I have been able to obtain is the one accompanying, of Los Angeles county, and I have had valuable assistance in placing the different vineyards upon it, and giving names of owners and acres, from Messrs. Fanning and Brierly. It required much work to get it in the present shape.

In San Bernardino county there are other vineyards besides Cucamonga, which is given on the map of Los Angeles county, owned by Dr. Barton, Mr. Crafts, Mr. Pain, Dr. Edgar and Mr. Pishon, amounting to about 200 acres. There is also an awakening to the viticultural interest in that county and Ventura and San Diego, all of which are buying the finer varieties of grape cuttings for planting.

Riverside has many small vineyards, planted generally with Muscat of Alexandria and Muscatela Gordo Blanco, from which a very fine quality of raisins are made.

From the accompanying map it will be seen that there are 5713 acres of vineyard, representing about three hundred owners.

Taking the present year's yield, which is the largest we have ever had, at 10,000 pounds to the acre, it gives 57,130,000 pounds of grapes produced in this county this year; and, taking 15 pounds of grapes for a gallon of wine, this would give the grand total of 3,800,000 gallons of wine.

These figures seem large, even to me, yet I cannot see how I can make them less.

I am in a favorable condition to make estimates, for I have bought the product of many vineyards for several years, and this year have bought over 12,000,000 pounds of grapes. Although five tons to an acre, as an average, may seem large, yet several vineyards which I bought yielded ten tons, and I believe five tons is within the fact. The vineyards of this county are generally in full bearing, and enough has been unavoidably omitted to make those good that may not be in full bearing.

In estimating the wine product for this year at 3,800,000 gallons, it is based upon the supposition that all was made into white and red wine. This is, of course, not the case; for much has been made into sweet wine, which requires more than 15 pounds to the gallon, and much has been made into brandy. Were I to estimate the production of this county I would say that there had been made 2,000,000 gallons of white and red wine, 500,000 gallons sweet wines, and 300,000 gallons of brandy.

Had I had the time I would have visited the different wine makers, and perhaps gotten more exact figures; yet it is a hard matter to do so, for no one wishes to appear as making less than his neighbor, or to give the kind of wine made, but for this reason there has not been time, for at the present writing grapes are not yet all crushed.

There are several large manufactories for wine making in our county, and all have had all they could do. The more prominent are Dreyfus & Co., Kohler & Frohling, Mr. Bernard, J. DeBarth Shorb, M. Keller and Stern & Rose. There are very many more who work up their own grapes; and, generally, all the vignerons of Anaheim belong to that class.

Probably half the vineyards of this district are irrigated; and, although grapes can be grown in any part of the district without irrigation, yet with irrigation larger crops are produced and vineyards retain their fertility and thrift for hundreds of years. Irrigation entails much work, and it may yet be considered an open question which pays best—deep tillage, without irrigation, or irrigation.

Lands without irrigation can be bought very much cheaper, say for one-fourth, and this again forms a factor in the problem of "Which pays best?" It must, however, be confessed that as long as the belief prevails that irrigation is a preventative of the phylloxera, there is a comfortable feeling in having water.

Of course, like the balance of the State, we have thousands of acres which are adapted for the growing of the vine. Men and money are all that are required to make vineyards by the ten thousands, and I doubt whether a better climate or soil can be found even in this State for the production of grapes of the best quality. Land, too, can be had cheap enough, say from $10 to $100 an acre—the first without irrigation, the latter with it. Nor would it follow that the cheaper land would be the poorest for grape growing, for the reverse might be the case. Our mountain slopes and our uplands are now the lowest in price, and yet these lands are the lands that will produce grapes of the highest value. The possibilities here are immense. A great future is in store for us, if it is a fact, and I believe it, namely, that Europe will buy our wines.

It may be safely stated that grapes grown for sale to wine-makers, this year,

have netted $90 an acre, for the crop was large and the price good. The average price this year was somewhere near $21 a ton. The wine and brandy made would sell to-day for over a million of dollars.

Much more might be said, but time does not permit me to say more. It has been with difficulty that I have been able to do this much, and I will promise myself the pleasure of resuming the subject at some future time.

L. J. ROSE.

Commissioner for the Los Angeles Viticultural District.

Report of Mr. Chas. A. Wetmore, Commissioner for the State at Large.

San Francisco, Dec. 22nd, 1880

To the Board of State Viticultural Commissioners:

Gentlemen—Being a member of your honorable Board "for the State at large," and having no special district duties to perform, I shall devote my attention in this report, which I respecfully submit, to sundry topics of general interest to the viticulturists of the State of California.

The Wild Vines of California and Arizona.

The wild vines of America are at present commanding the attention of viticulturists throughout the world. This unusual interest is caused by the discovery that, with one exception (the *Labrusca*), all the species yet experimented with in the districts of France, most affected by phylloxera, have proved to be proof against the severest attacks of the insect. Of the nine species described by botanists, viz: the *Rupestris, Cordifolia, Riparia, Arizonica, Californica, Aestivalis, Candicans, Labrusca* and *Vulpina*, only the *Californica* and *Arizonica* have yet to be tested in phyloxerated vineyards. All the others, excepting the *Labrusca*, are found to be resistant.

Of the several hundred cultivated varieties of the *Riparia, Aestivalis, Labrusca* and *Vulpina*, all partake more or less, of the strength or weakness of the mother stocks, with this apparent distinction, viz: the degree of resistance of the cultivated varieties varies generally in proportion to the improvement which culture has accomplished, the varieties being weakened as they are improved as fruit bearers. If there are exceptions to this rule, they only serve to prove it.

The cultivation of these stocks may be practiced for either of two purposes, viz: *first*, as substitutes for the so-called European vines of the species *vitis vinifera*, without grafting, in which case selection is made of the most valuable fruit bearers; *second*, as grafting stock to bear and preserve the esteemed varieties of the *vitis vinifera*, in which case only the resistant power of the graft bearer and its adaptability for grafting are to be considered important.

For the present, it is improbable that viticulturists of California will look with

favor upon these wild species, or their improved varieties, as substitutes for the "European" vines; present demand for them will be generally limited to their usefulness as graft bearers. While this is true, I think it is however probable that many of our native varieties will become in the course of time equal in value as fruit bearers with their more distinguished European cousins.

In searching for grafting stocks, our viticulturists should not place too much reliance upon the careless statements and recommendations of vine growers of States east of the Rocky Mountains. An inquiry for a phylloxera proof variety, directed to a grower in Missouri, Ohio, Texas, etc., would very naturally bring a response in favor of some vine cultivated in those places for its fruit. In the eastern half of the United States, the European vine (or Asiatic *vinifera* species) does not flourish. American energy has proved itself in nothing more than it has in the earnest, painstaking and successfnl efforts of vine growers to improve the wild vines found in the woods, along the rivers and in the mountains of the "new world." What they have already accomplised ought to be an incentive to the people of our more favored viticultural regions. We have a great deal more to do and to learn than we have yet done to be proud of; we may boast of our soils and climates, but nature gave those to us ready-made; we may boast of our fertile vines, but we borrowed them from Europe; we may boast of our good ordinary wines, but we borrowed our knowledge and generally our talent from Europe; we borrow our knowledge of the phylloxera from Professor Riley, whose researches were made while State Entomologist of Missouri, and from Professor Planchon, who was sent by France to the United States to study the habits of the insect; we borrow our knowledge of the resisting power of American vines from the National School of Agriculture, of Montpellier, France, and the Agricultural College of Missouri; we borrow our viticultural instructions, excepting that acquired through the hard and slow "rule of thumb," from French books and schools, and the works of viticulturists of Missouri and Ohio; we subscribe for viticultural papers published east of the Rocky Mountains; we accept the princely gift to this State made by Col. Agoston Haraszthy in 1860, who brought us hundreds of varieties of valuable grapes from Europe, including our now famous Zinfandel, but whose noble efforts were so little appreciated at the time by the State, that the Legislature neglected to pay his expenses while traveling as a State Commissioner; we boast of a State University with its Agricultural College, notwithstanding it is unable for want of means and suitable experimental fields, to impart as much instruction in grape-growing as is provided by the intelligent foresight of the State of Missouri, whose agricultural professor is already an authority in viticulture, called upon by our people for advice as well as selections of vines. I do not mean to disparage the great progress we are making in this industry, nor the great value of individual efforts that have been made in its behalf, but I do charge that the public spirit of this State, as a collective body, has done very little in fostering productive industry while it has expended its force lavishly in fostering the manipulation of the results of labor. We cannot close our eyes to the fact that we are lacking in many advantages for study and facilities for industrial progress, which the State should supply, and that the people are only now awakening to a consideration of their backwardness in all that pertains to the application of science in aid of industry. Our students should not be obliged by necessity to go to Missouri, the District of Columbia, or France, to find schools which teach us how to do our own work, to

study collections of vines, which we ought to have established here when Col. Haraszthy brought the nucleus to begin with, or to study entomology, which is of far more interest to our State than to any other in the Union.

These preceding remarks I deem to be necessary to counteract a popular disposition at the present time to glorify the State in consequence of the present financial success of our viticulturists, to boast of the trifling production of six to twelve million gallons of wine annually, which ought by this time, if it had been fostered by the State and the people, to have been at least one hundred million gallons of superior quality, and then only in a condition of infantile health, for we have not half seconded the free offerings of nature and the enterprise of a few citizens. It is not to our credit that we can learn nothing of practical value from the experience of the Sonoma Valley, where the phylloxera has existed as long as it has been known in Europe, while we turn for aid to France, who sent a scientist to America, as soon as she discovered that one of her industries was menaced by a disease, knowledge of which might be obtained on this side of the ocean.

I was led to this thought in reflecting upon the fact that of all the species of indigenous American vines, those of our own coast are the only ones concerning which we are ignorant; that, while Sonoma wine growers are importing vines from Missouri and neglecting the virtues of those that grow wild in their own valley, France, Portugal, Spain, Italy and Australia have eagerly seized upon our *vitis Californica*, acting upon the first intimation that it was worthy of experiment.

A laudable movement has been started by the Hon. Horace Davis for the establishment of a branch of the National Agricultural Bureau on this coast; if accomplished, it would undoubtedly be of value to us; but while this should be done, it will be a confession of infantile impotence, unbecoming a full grown and independent State, having resources of its own, if we fail to establish under our own control all the agricultural stations that we need for the aid of our own peculiar agriculture.

During the hours and days that I have been able to spare from private business, I have been able to learn enough, aided by the generous assistance of private citizens in this State and Arizona, concerning the wild vines of the Pacific Coast to convince me that they are worthy of cultivation;—first, to provide grafting stocks for noble vines; secondly, to experiment with in search of new and valuable wine grapes. Botanically all that is known of them may be said in the words of Dr. G. Engelmann, whose valuable manual of American grape vines is published in the "Bushberg Catalogue," viz:

"VITIS CALIFORNICA, Bentham. The only wild grape of California, has rounded, downy leaves and small berries, and is not made use of as far as known. The seeds are obtuse, with a short beak, elongated chalaza, and very slender raphe.

"VITIS ARIZONICA, Engelm. Similar to the last, but tomentose only when young, later glabrous, with middle-sized berries, reported to be of a luscious taste."

The *Californica* flourishes in the wild state in all the viticultural regions of California from San Diego to Shasta; from coast valleys to the foot hills of the Sierra Nevada. It is found in low and in high altitudes—but generally along streams of water and in shady cañons. I have even found it on high ground at a distance from water, as for instance on the plateau of Howell Mountain. There are few, if any, places in the State, especially noted for their adaptation for viticulture, where the wild vine is not found growing luxuriantly. A very accurate painting illustrating the

foliage and fruit of the *Californica* has been made for me by Miss Ada Camden of Shasta county.

The *Arizonica* flourishes in Arizona in mountainous regions from Prescott to Tucson. My researches in this respect lead me to believe that there are either several very distinct varieties of this species, or there are other species in Arizona, which may not have been described. I have received this year fruit gathered in the mountains near Prescott at 6,000 feet altitude.

One year ago, when I commenced these studies, I was told by Mr. Mattier, who was assisting me at Harbin's Springs in Lake county of this State, that he could detect five varieties of the *Californica;* he then produced for me three distinct samples of wine, each materially different in color and character. This year, after more careful observation, he replied to my question—"How many varieties do you find?" "As many as there are vines!" The latter statement is probably near the truth—each vine, being a seedling grown on varying soil under varying circumstances, develops peculiarities of its own. Therefore the field of research in seeking the most valuable for propagation of cuttings is wide enough to satisfy any industrious ambition; his success this year in selecting fruit from single vines and fermenting the juice separately gives abundant reason to hope that among these vines valuable varieties for wine making will be found.

So far as experiments have been made in planting cuttings of the *Californica*, it appears that they take root slowly and with difficulty; on the contrary, however, plants may be grown from the seed with the greatest ease. Seedlings of this year's growth may be seen flourishing vigorously at Berkeley, St. Helena, Santa Clara, Los Angeles and elsewhere. No more difficulty is encountered in causing the seeds to germinate than is common with beet, or carrot seeds. The precautions, which I have observed apparently necessary, being not to sow too early, lest the weeds overgrow the nursery before the seeds sprout, rendering weeding dangerous, and not to sow too deeply—half an inch depth in good garden, or nursery soil being sufficient, and the time of sowing being about the first of April, the seeds having been soaked a little in water. Wherever the seedlings have been started not too thickly, with from four inches to a foot space between them in the rows and at least eighteen inches between the rows—in good soil, the young plants have generally attained in this season a height of from two and a half to three feet, with more or less lateral growth, and buts from one-third to half an inch in diameter. Pruning them judiciously in the Spring will probably produce good sized buts next season, amply stout to support any graft; most of those well cultivated the first year might do well to graft the following Spring.

Concerning their adaptability as grafting stock, I have no longer any doubt, and I feel certain that the seedling roots will prove vastly more useful to graft upon than rooted cuttings. It is easier and cheaper to produce vigorous seedlings than weak rooted cuttings. A pound of seeds collected this year by Mr. Mattier, which he offers for sale at a dollar, will furnish at least four thousand germinating seeds. (The seeds as collected contain dead as well as the sound ones and the husks of the broken berries.) An acre of ground sown in drills eighteen inches apart—seeds four inches apart—would produce about sixty thousand seedling roots. At ten dollars per thousand—the average price of Missouri cuttings delivered here—an acre would yield six hundred dollars worth of seedlings. A seedling one year rooted

would be worth more than a cutting unrooted. If only one-half were sufficiently developed for grafting the second year, this method of propagation would still be profitable.

The most satisfactory proof of the adaptability of this vine for grafting with *Vinifera* stocks I found in the vineyard of Mr. Chas. Lefranc, in Santa Clara County. Twenty-four years ago, desiring to utilize his imported cuttings to the best advantage by cutting them in short pieces, he grafted quite a considerable number on wild stock taken from the cañons near his home. Fortunately for our present study, those grafted vines to-day are still preserved, and are equally as flourishing as any others in his vineyard. I neglected to take a note of all the varieties thus grafted, but all seemed to be growing equally well. I remember seeing, besides varieties of French wine grapes on this stock, a fine Flame Tokay, which was climbing a trellis.

What effect the graft may produce upon the root of the grafting stock is not definitely known. A theory has been advanced in the East that grafting on phylloxera-proof stock will prove useless, because, as some claim to be true, the graft will change the root entirely, so that in a few years the latter becomes the same as if the graft had been planted as a cutting. This certainly is not true of the *Californica*, the proof of which may be found in Mr. Lefranc's vines grafted twenty-four years ago. That the graft exerts some influence upon the root is evident, because the suckers from the latter, which were found quite common, bore leaves resembling in shape those of the graft; but the texture and surface of the leaves of the suckers, or sprouts, were apparently identical with those of original vines in the wild state, the under surface wooly and the color the same shade of green. More important in proof of this was a sprout from the root of the grafted Flame Tokay, which was this year bearing bunches of small wild fruit alongside of the grand clusters of Tokays, the fruit of the sprout being improved somewhat by the culture it had received.

The most important discovery of the year, however, in this respect, has been made by Mr. Mattier at his little Hermitage, near Harbin's Springs. He has taken short pieces of roots of the wild vine, cut six to eight inches in length—*ad libitum* anywhere among the roots torn from the ground—pieces of about one-third to half an inch in diameter, and grafted upon the upper ends, minute slender pieces of canes of cultivated vines, one inch to an inch and a half long, closing the union with grafting wax, bound with cotton strips, and planted them in the late spring alongside of stout cuttings of the same cultivated varieties. The results were astonishing. I personally examined them in the latter part of November. The soil being very favorable the ordinary cuttings made wood three feet fong; but all of the little grafts on wild roots had grown *from ten to fourteen feet*, making stout stems of more than ordinary thickness, full of rich and swelling buds. I remember one of the grafts was from *Mission* wood, another from *Pinot*. The power of the *Californica* root to invigorate the *vinifera* graft could not be more satisfactorily demonstrated. Only in one case had the graft taken root, the point of union having been placed too deeply in moist soil.

There remains, I think, only to be demonstrated by actual experience what varieties may with most advantage be grafted on *Californica* roots, and whether under the same conditions better results may be obtained in this way than with other American wild stocks, and, more important, whether these roots are actually phylloxera proof when subjected to the test in infected vineyards.

Concerning resistance to the phylloxera, a great deal may be learned in advance of experiment by careful examination of the wild roots by means of the microscope and chemical analysis. Microscopic examination will determine whether the bark is of dense structure, which Professor Foex, of the Mountpellier School, considers the cause of the resistance of American vines. Chemical analysis, such as is referred to in one of the exhibits to the report of your Committee on "Phylloxera," etc., will determine whether they contain resinous principles in proportions analogous to those of the roots of resistant vines, which have been analyzed and reported upon.

In the absence of these preliminary tests, we have many reasons for believing that the *Californica* is a resistant vine: *First*, because, although found growing wild in the immediate vicinity of vineyards dying from phylloxera, no sick, or affected wild vines have yet been observed, and their roots having been examined have not been found affected; *second*, because a mechanical examination of the roots is sufficient to show the unusual compactness and toughness of their fibres; *third*, because all other American wild vines (excepting varieties of the *Labruscas*, which are very different in character from the resistant vines) are resistant. These reasons make probability very strong.

No really satisfactory test has yet been made in any of our diseased vineyards with the *Californica*. Mr. Appleton this year planted two specimens among the phylloxera, and noted results. The plants grew very well through the Summer. In the Fall, he observed one looking sickly, and taking up the roots found them covered with phylloxera. This caused him to believe that this vine would not resist. His experiment is defective in extent and time. Resistant vines when first placed in infected spots are attacked like all others by the pest; the test of resistance, however, is that the resistant vine will outlive the attacks and gradually free itself of the pest. Placing a new plant in the midst of insects multitudinous and hungry, before it has had time to strike down its tender roots, in poor soil, dry and clayey, is a severe test, because the new and first rootlets are easily injured. Time only can prove whether it can live and rid itself of disease by failing to furnish its sap to nourish the insect broods from its wounds and sores, or whether, when once rooted, it is subject to attack. I believe that, fairly tested, it will succeed; not by using slow growing cuttings, but by the seedling roots, all ready to grow, or by the system of grafting pieces of roots, as tried this year by Mr. Mattier. Unfortunately, so far, the best experiments with this vine have been made where there is no phylloxera. Next Spring, however, there can be no excuse for not trying the one year old seedlings, which can now be obtained for use in infected places.

Concerning the value of the fruits of the *Californicas* and *Arizonicas*, I have considerable more to offer now than I had last year. Mr. Mattier has been fermenting larger quantities of the *Californica* fruit from selected vines. By selecting them he has avoided nearly all that was unfavorable in his experiments last year—proving that for wine purposes the vines must be carefully selected and propagated at first from cuttings. The test of its wine produciug capacity can never be entirely fair until the vine has been cultivated. In its wild state it grows to wood in places unfavorable for fine fruitage—over oak trees and in thickets—many of the vines covering large areas of ground and distributing their virtues through thousands of bunches of small berries in which tannin and acids predominate. Later on, fair

analyses of sufficient quantities of the wine fermented will be made; preliminary tests of new must in small quantities, will be referred to at the present time.

Through the kind assistance of Gen'l T. J. Butler, of Prescott, Arizona, I have succeeded in obtaining two small lots of fruit from wild vines growing in his vicinity, the seeds of which have been saved. The first lot came from an altitude of 6,000 feet, near Prescott. The leaves accompanying the fruit did not resemble others from Arizona, which were undoubtedly of the *Arizonica* species; they resembled the leaves of the *rupestris* as described by Dr. Engelmann, and may have been of that species—or some new one. A painting of the fruit and leaves was kindly made for me by Miss Minnie Woodward of this city, for future reference. The second lot of fruit was, without doubt, from the *Arizonica*. Part of the seeds have been distributed outside of the State; the rest will be sown here this coming Spring. I received also through the agency of Gen'l Butler several samples of wine made by different parties from the wild grapes of Arizona. One of them from a white variety, growing along the Verde river, was very interesting.

The samples of fresh juice and fermenting musts of these *Californica* and *Arizonica* grapes were submitted by me to Professor Federico Pohndorff, a most skillful and experienced œnologist now of this city, from whom I received the following reports:

SAN FRANCISCO, Nov. 21, 1880.

CHARLES A. WETMORE, ESQ.—

Only two of the several samples of wines from wild grapes of Arizona, you sent me for examination, I was able to consider up to this moment, and owing to my want of leisure, could only scrutinize them rather superficially.

One is the bottle of must pressed through a towel from their accompanying skins, on the 5th instant.

The juice having fermented without contact with these husks, has nevertheless a grand, though deeply brownish, rather than a ruby or bluish color.

The skins, fifteen ounces in weight, fresh, but without liquid, I put to two ounces of cane-sugar and eight ounces steam-condensed water.

On the 10th instant I racked the must of the bottle, in order to prevent micoderma from forming on its surface. The lees I allowed to solidify. Fermentation of both the must and husk-wine proceeded well, although I had no means of favoring it by evenness of temperature.

With still four per cent. of saccharine yet to be fermented, the must contains at present 7.85 per cent. of alcohol. Thus, after finished fermentation, it will be about 9.70 per cent., a power sufficient to keep the wine, notwithstanding its astounding content of nearly thirteen per mille of free acids and a considerable amount of tannin. For potable purposes the must by itself would be too harsh in taste, but nothing would be in the way, if fermenting the juice of that kind of grapes like red wines on the husks, to use it in the press for blending with musts of noble grapes.

The amount of color of the husks-wine is enormous and confirms the supposition of the extreme usefulness of the wine as a color-giving medium in blends with light colored reds. Extractive matters would at the present stage of the must and husk-wine together doubtless weigh above four per cent.

The distillate of the alcohol test has an agreeable free taste and a good flavor. For brandy purposes, therefore, the Arizona wild vine would be profitable, as its alcoholic yield surpasses that of the vines of Charente, the Cognac district in France.

No volatile or acetic acids seem to have so far generated in your sample and with proper care bestowed on the product of the vines it would present no greater danger in a cellar than the wine of cultivated vines has to run. Carbonic gases are still in considerable proportion in suspension in the samples.

The next sample examined is No. 3, from wild grapes from Ash Creek, Prescott, Arizona, made by Mr. Dan. Hatz. The label on the bottle states that the liquid of thirty-five gallons of grapes, sugar and water added, proportions not given, was sixty gallons. Its alcoholic content thus far, the must still being in fermentation, is 8.3 per cent., and of free acids about 10.85 per mille are found. The amount of saccharine still to undergo fermentation may be three per cent. Its color is particularly deep, its taste, if not very expressive, still fruity, resembling a vinous taste, and doubtless, rightly proportioned, the addition of its grapes to the press-mass of red grapes of vineyards, would be useful both as to color and even mildness of taste, the amount of free acids notwithstanding.

Shortly more about the above samples and others you submitted to my examination.

What little I have an opportunity of seeing of the subject you so patriotically have taken in hand, the demonstration of the importance of the wild vines for the future of the vine plantations, cannot but justify me to congratulate you on the energy of your endeavors for the public good, which will be surely recognized by thinking viticulturists. There can be no risk and there is evidently profit in civilizing the wild vine.

F. P.

SAN FRANCISCO, 15th Dec., 1880.

CHARLES A. WETMORE, ESQ.—

DEAR SIR—Resuming my report on different samples of wines from the wild vine *Californica*, I have to say, first, about the two samples from Harbin's Springs, that both, received on the 26th November, were racked December 1st and December 14th.

In the first I found, yesterday, 8.1 per cent. alcohol developed, and the precipitates were considerable. Free acids, 8.7 per mille and a small fraction. Color, deep rich ruby, superior to that of any wine from cultivated vines in the state. Taste, vinous, fruity, in counterdistinction to a berry taste; no disharmony of extractive or unconverted saccharine, and, save a pronounced predominance of harsh tannic taste, not dissimilar to that of very ordinary cultivated grape wine. The sample is too small to admit of new tests which may yield a fraction more of alcohol. An addition of juice of the Harbin Springs wild grape to the press mass of Mission grape must, if properly proportioned, would probably not in the least prejudice the quality of the latter, whilst its color would be largely enhanced by the coloring power (three colors) of the wild grape.

The second sample of 1880, Harbin Springs' Red, from the bunches of *one single vine*, yields, in yesterday's test, the astonishing proportion of 11.45 per cent. of alcohol; free acids, more than 9 per mille, and a large amount of tannin, salts and alkalis in the 35 per cent. of liquid lees of the mass. Taste, absolutely dry; thus sugar seems all converted, but a great quantity of carbonic acid gas is remaining. Color, very deep ruby, with a slight tinge of brownish red. Taste, good, free of berry taste, vinous, not unpleasant of the racked wine. Distillate, good, grape-spirit like.

The fact of this liquid being from one vine full of bunches, and withal having the amount of saccharine to develop the proportion of about 11½ per cent. of alcohol, speaks volums for the extreme usefulness of this kind of vine. Even if used in hedges, the abundance of bunches it seems capable of producing would constitute a source of an income, applying its juice for distilling, as without any cultivation it yields as much alcohol as cultivated vines. But as it can and ought to be used for wine purposes, its extraordinary deep color will still more recommends it. Add the resistance the wild vine shows, as is supposed, against phylloxera attacks, and surely, the qualities of the vine will be recognized by the progressive planter.

Samples from Arizona Territory wild grape wines, No. 1, that made by Mr. Dennis Miller, at Big Bug, twenty miles from Prescott, received November 5th,

racked November 19th and December 6th, yielded 8.9 per cent. alcohol; free acids, 11.3 per mille; in its extractives, alkalis and salts; some saccharine still in solution. Taste, earthy, but vinous withal, and notwithstanding the objectionable impression it produces on the palate, to be classed as of wine. Method of elaboration not stated, but it might be supposed, that if properly made and especially if the vine were grown in soil with less nitre for the root-food, its juice would taste more freely fruity and pleasant. Color, grand and powerful, like the greater part of the samples. Distillate, good, grape brandy like, but slightly salty.

No. 3 sample of wine from the white wild grape, made by Mr. James Davis, Verde River, Arizona Territory: Alcoholic test this day 8.25 per cent., with sacharine still unconverted. Free acids, 8.1 per mille. Color, not white, but from too prolonged contact with the grape, skins, reddish. Taste, free vinous, although still sweetish, but really not inferior to many of the imperfectly fermented young Mission wines.

No. 4 sample of two-years old Red, from wild grape, made by Mr. J. D. Cook, Willow Creek, Arizona Territory, five miles west of Prescott, has passed through the testing apparatus twice without yielding any alcohol, so that, as the manner of its manufacture is not stated, and from its bright state and sweet fruit-like taste, it must be presumed to be a preserved juice rather than a wine. Its taste and flavor, however, are those of a delicious Port-like wine, without any of the spiritous additions to the taste of the same, except that of a great content of ethers, which are generally present in liquids of rich alcoholic contents.

Nothing would take away from my mind the impression, that in the wild vine we shall have a valuable addition in the vineyards where that plant will be adopted.

Yours truly,

F. POHNDORFF.

Samples of seeds of the *Californica*, collected for me last year, besides being distributed in this State, were sent to Prof. Husmann of the University of Missouri, Professor Foex, of the National Agricultural School at Montpellier, France, A. H. Trimoulet, of the Viticultural Union of the Eutre-deux-Mers, France, the French Department of Agriculture and Commerce, Messrs. Offley, Forrester & Co., London, (whose vineyards are in the Douro, Portugal), The Phylloxera Commission of the Douro, and the Italian and New Zealand Governments. The following reports, indicating the interest taken in this vine have been received:

UNIVERSITY OF THE STATE OF MISSOURI,
COLUMBIA, MO., August 11th, 1880.

DEAR SIR—Your favor received. Only about a dozen plants of the seeds you sent have come up. I think they must have been too dry. We have a terribly dry season here, and they have made but little growth, but show entirely different characteristics from any of our grapes here * * * *

Yours truly,

GEORGE HUSMANN.

Department of Agriculture and Commerce, National School of Agriculture of Montpellier; Viticultural Station.

MONTPELLIER, April 6, 1880.

DEAR SIR—Permit me to thank you for your kindness in sending me seeds of the *Vitis Californica*. I am infinitely obliged to you for having remembered my

request, for we (Prof. Planchon and myself) have had a great desire to possess this variety, which has not before this been imported into Europe. Thanks to your kindness, we are going to have an opportunity to study it.

The tendency toward the plantation of American vines becomes more and more established with us, by reason of the failure of insecticides in places which have been for a long time attacked by phylloxera. The types which we prefer are, for the sake of their fruits, the Jacquez (or Ohio, Cigar-box, etc.) Herbemont (or Warren), and the Black July (or Devereux Lenoir.) For grafting stock we prefer the wild *Vitis Riparia*, which is sent to us from Missouri, Iowa and Kansas, and the *Vitis Rupestris*, from Texas.

I take the liberty of addressing to you by this same mail a little pamphlet containing a resume of practical lessons in grafting American vines, which I gave a month ago at the College of Agriculture.

Accept, dear sir, my kindest regards, etc.,

G. FOEX.

CHAS. A. WETMORE, San Francisco, Cal.

SAN FRANCISCO, December 11th, 1880

CHARLES A. WETMORE, ESQ.—

DEAR SIR—I have pleasure in stating that the parcel of *vitis Californica* seeds, which you were good enough to give me for distribution in New Zealand, arrived safely at their destination and give good promise of success.

Mr. J. C. Firth, a large land-owner in Auckland, who takes great interest in acclimatization matters, received a parcel of the seeds direct from me. He writes, under date November 9th: "I have sown a portion of the vine seed you sent me, and it is doing well. I will plant them extensively at Mata Mata [an inland district of Auckland], where vines do very well."

The New Zealand Government, to which I sent the bulk of the seeds, has distributed them very extensively, together with a printed extract from your pamphlet "On the Propagation of the Vine," for the instruction of growers.

I have requested the New Zealand Government to have a note of the results made and communicated to me for the information of the Viticultural Commission and California vignerons generally. I have no doubt this will be done, as the Colonial Secretary writes to me: "The seeds of the wild vine have arrived and been distributed to persons who will be likely to make good use of them, in accordance with your suggestion."

I am, dear Sir, very respectfully yours,

ROBT. J. CREIGHTON.

The greatest interest has been manifested in this vine by the Phylloxera Commission of the Douro, Portugal, of which Mr. Forester, the son of the distinguished Baron Forester, whose efforts to promote the improvement of Oporto wines were so successful, is a member. About fifty pounds of last year's seeds were sent to Mr. Forester, since which time he has visited this State and ordered twenty pounds more. He was much pleased with the rapidity of growth of the seedlings under glass in London.

The seedlings of the first lot of seeds distributed last Winter have been named by Mr. Mattier, *Mattias*, to distinguish them from future selected assortments. His collection of seeds this year, now offered for sale, has been made from selected vines.

Monsieur G. Morlot, manager of one of the largest properties in Haute Marne, France, has repeatedly written inquiring about the *Vitis Californica* and *Arizonica* since the publication of notices of these experiments. Recently he has ordered large quantities of seeds and cuttings and all the seedlings (Matildas) that can be obtained. One hundred and fifty pounds of seeds and 20,000 cuttings will be sent to him.

THE WILD VITIS VINIFERA.

The wild vines, from which the European cultivated varieties have sprung, are all classed under one species botanically, whereas in America botanists have described already vine distinct species. The *Vitis Vinifera* is generally supposed to have originated in Asia, so that in France, what we generally call the European vine, is generally called the Asiatic. There is room, however, for disputing the theory that all the European vines came from Asia, although botanically they may all be of one species. Wild vines are found in Europe, and that their origin need not be attributed solely to accidental wild stocks forming from seedlings of cultivated vines, is shown in an interesting manner in the standard work of Thudicum & Dupre, who call attention to the fossil grape leaves found in Germany.

Certainly, however, it is true that most, if not all of our leading varieties of wine and table grapes, imported from Europe, have been propagated for many centuries—most of them at least two thousand years without recourse to the seed, viz.: by cuttings only. It is safe to say that the vitality of our foreign varieties is generally at least two thousand years old.

It is not known in what proportion any of our valued wine grapes will reproduce themselves from the seed without material variation in the fruit; nor what varieties will reproduce a general average good result in fruit from the seed suitable for fermentation, if not for table use. It is my belief that many of our wine grapes, if propagated from the seed rather than by cuttings, would produce better plants with better roots and the fruit, though varying, would in the average result, operated under the wine press and in the blending vats, be equally valuable with the fruit obtained from rooted cuttings. Some barren plants would undoubtedly be produced, but these, bearing only male flowers, might be left to assist the hermaphrodite plants in fructifying, or might, together with deteriorated seedlings, be grafted. Concerning these male seedlings, I will quote a paragraph from Dr. Engelmann in the "Bushberg Catalogue," viz:

"All the true grape vines bear fertile flowers on one stock, and sterile flowers on another separate stock, and are, therefore, called *polygamous*, or, not quite correctly, *diœcious*. The sterile plants bear male flowers with abortive pistils, so that while they never produce fruit themselves, they may assist in fertilizing the others; the fertile flowers, however, are hermaphrodites, containing both organs and capable of ripening fruit without the assistance of the male plants.* Real female flow-

"* These fertile plants, however, are of two kinds; some are *perfect hermaphrodites*, with long and straight stamens around the pistil; the others bear smaller stamens, shorter than the pistil, which soon bend downward and curve under it; these may be called *imperfect hermaphrodites*, approaching females, and they do not seem to be as fruitful as the perfect hermaphrodites, unless otherwise fertilized.

"It is proper here, to insist on the fact that nature has not produced the male plants without a definite object, and this object is, without any doubt, found in the more perfect fertilization of the hermaphrodite flowers, as it is a well established fact that such cross fertilization produces more

ers, without any stamens, do not seem ever to have been observed. Both forms, the male and the hermaphrodite, or if preferred, those with sterile and those with complete flowers, are found mixed in the native localities of the wild plants, but only the fertile plants have been selected for cultivation, and thus it happens that to the cultivator only these are known, and as the grape vine of the Old World has been in cultivation for thousands of years, it has resulted that this hermaphrodite character of its flowers has been mistaken for a botanical peculiarity, by which it was to be distinguished, not only from our American grape vines, but also from the wild grapes of the Old World. But plants raised from the seeds of this, as well as of any other true grape vine, generally furnish as many sterile as fertile specimens, while those produced by layering or cuttings, of course only propagate the individual character of the mother-plant."

More interesting instruction on this and other topics may be obtained by studying Dr. Engelmann in the "Bushberg Catalogue"—published by Messrs. Bush, Son & Meissner, St. Louis, Mo. I believe that many of our best European wine grapes are simply varieties of wild vines cultivated without hybridization, and if so may be reasonably relied upon to reproduce themselves fairly from the seed, a portion, or all of the male seedlings being grafted. There is a large class of vines, cultivated in Germany and around the base of the Alps into Austria, which have clinging to their names the words Sylvaner, or Zierfahndl, each denoting some tradition of sylvan origin. Our word Zinfandel has been corrupted from the latter.

The best authorities on the Rhine grapes, while discussing their origin, incidentally have said that no accidental seedlings have yet produced new varieties of the Riesling. If this be true, may we not with some confidence plant the Riesling seeds?

I have been unable to procure the evidence of our viticulturists concerning experiments with seedlings, no responses being made to my published circulars. Generally seeds have been planted only to procure new varieties—and hybridization has been practiced. Hybrids, no doubt, there are many among our cultivated vines, and these would prove unreliable for seedling vineyards. Careful experiments should be made to test these questions of fact.

There is now growing at Mrs. Blanchar's vineyard in Napa county a seedling Muscat, eight years old, which has been bearing fruit, apparently fine, since the fourth year. Mr. Groezinger reports having seen at the same place seedling Zinfandels, bearing fruit equal in quality to the ordinary kinds, but they have been accidentally destroyed.

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abundant and healthier fruit. Vine growers might take a hint from these observations, and plant a few male stocks in their vineyards, say 1 to 40 or 50 feet of their fertile stocks, and might expect from such a course healthier fruit, which probably would resist rot and other diseases better than fruit grown in the ordinary way. I would expect such beneficial influence, especially in all varieties that have short stamens, such as the Taylor. Male stocks can be easily obtained either in the woods or from seeds. It is of course understood that the males ought to belong to the same species (not necessarily to the same variety), as the fertile plants of the same vineyard. European vine growers may also profit by this suggestion."

Conceiving it to be important to pursue this subject even to the native homes of the wild *Viniferas*, I addressed the following letter to the Secretary of State:

SAN FRANCISCO, September 18th, 1880.

HON. W. M. EVARTS,

Secretary of State, Washington, D. C.

MR. SECRETARY—The ravages of the phylloxera among the vineyards of Europe and the United States have finally brought vine-growers to the necessity of seeking to discover varieties which may be proof against the attacks of the pest. So far, it is known, by experiments in France and the United States, that most, if not all of our American wild vines are endowed with constitutions which enable them to resist the parasite. It is my opinion that it will be found yet that the wild vines of Asia, from which the European vines have been taken centuries ago, are also to be relied upon. I believe that the weakness of the European vines now cultivated in this country and Europe, is due to the exhaustion of the vitality of the plant and the weakness engendered by hybridization during a long period of propagation, dating before the Christian era, during which time propagation has been operated by means of cuttings and hybrids. The law of nature, which points out the seed as the true and normal means of propagation, has been ignored. I believe if we should go back to cuttings or seeds of the original Asiatic varieties of the *Vitis Vinifera* taken in the savage state, we should be able to regenerate our vineyards with healthy stocks. It is, at least, very important to ascertain whether the theory be true or false.

In the interest of viticulture, which is now becoming an industry of vast importance in the United States, a work of great value may be accomplished through your Department.

If you will devote to this industry a small part of the labors of the Diplomatic and Consular Service, as you have so intelligently done in respect to other industries, we may obtain information of incalculable value. Therefore, permit me to ask that a circular letter of instructions may be dispatched by you to all the consular officers throughout the world, and especially to those resident in Asia and southeastern Europe, calling for such information as they may be able to obtain concerning grape vines in the countries where they are:

1st. Concerning any wild vines that may be growing there—the different varieties, characteristics of growth and fruit, and the practicability and expense of procuring cuttings and seeds for use in this country. [Our interest is particularly for this State, but the information will be gratifying to other parts of the United States.]

2d. Concerning varieties of vines cultivated and their original peculiar characteristics, diseases, &c. This item need not apply to France and other leading vine-growing countries, where there is already sufficient published concerning them. It would be important, however, to obtain a classification of the varieties of vines of Spain, Portugal, Italy, Austria, Greece, Russia and Asia Minor. From France and Germany we have books describing their vines, but not from the other countries in sufficient detail.

I am informed by travelers that very strange and comparatively unknown kinds of grapes appear for sale in cities of Japan, China, India and other Asiatic places. An army officer of Great Britain observed extraordinary grapes at Cabul, coming from the Himalaya, which he believed were wild varieties.

If the consuls could procure seeds of the varieties, which are little known or unknown in the United States, from southeastern Russia, the Caucasus (whence tradition says our cultivated European vines came), Asia Minor, the Himalayas and other strange parts, we should be glad to receive them for experimental work in this State. Sometimes they might send cuttings also, which should be packed in boxes snugly and filled in with sand, or humid (not moist) sawdust. If the sawdust

is too moist the cuttings might sprout and be ruined. All seeds and cuttings should be carefully labeled and varieties described as nearly as possible, and the exact place where found preserved for future use and reference.

The seeds and cuttings of the wild vines of Asia and the southeastern part of Russia, are especially important to obtain, also the cultivated varieties of that region.

To obtain seed, it is only necessary to crush ripe fruit without injuring the seeds, and dry in a shady and dry place. Small sacks or tarred paper will do well to send them in. The seeds need not be separated from the dried skins and pulp. It would be an advantage to have them just as they were dried in order to study the dried skins and pulp.

It is possible that something important might be found in the southern hemisphere; hence it would be well to make such a circular general, although we look to Asia for more interesting results.

Hoping that this request will meet with your approval, I remain most respectfully your obedient servant,

CHAS. A. WETMORE.

Vice-President and Chairman of Executive Committee of the State Viticultural Commission.

The following reply was received:

DEPARTMENT OF STATE,
WASHINGTON, September 30, 1880.

To Charles A. Wetmore, Esq., &c., &c., San Francisco, California:

SIR—I have to acknowledge the receipt of your letter of the 18th instant, in which you solicit the aid of the Diplomatic and Consular Officers of the United States in obtaining for your use cuttings and seeds of wild grape-vines in their respective localities, and to inform you that the Department appreciates your suggestions and will issue a circular, agreeable to your request, after being informed to whom the packages should be sent, and in what manner the attendant expenses of procuration and transportation are to be provided. These expenses will, doubtless, be very considerable, and this Department is not provided by Congress, or otherwise, with any appropriation from which such expenditures could be defrayed.

I am, Sir, your obedient servant,

W. HUNTER,
Acting Secretary.

It being now too late to procure seeds this season, and most of the regions, such as those in Kashmir, being covered with snow, I have concluded to await the Spring for further efforts. Meanwhile, a liberal minded gentleman, now engaged in viticulture, Capt. Gustave Niebaum, has promised temporarily to aid in the matter so far as expenses are concerned, and until the State can attend to it for the public good. The State should establish an experimental vineyard for such purposes as these, as well as for others, where individual profit is not concerned.

Since preparing the preceding remarks, I have been presented with a small lot of seeds of two varieties of wild vines of the Kashmir Mountains, Asia, obtained by Mr. J. H. Drummond, of Glen Ellen, Sonoma County, through the assistance of a friend, an officer of the British Army. These will, I hope, furnish the nucleus of an important experimental nursery.

THE SEEDLING THEORY IN FRANCE.

Concerning the practicability and relative value of planting seedling vineyards, as compared with the ordinary system of propagation by cuttings, opinions are vaguely expressed. There is yet no certain evidence to sustain any well grounded theory. This field of experiment has not been systematically explored.

Admitting that the grape vine is very inconstant and produces from the seed plants of variable fruitage, and knowing well that choice hybrids and improved stocks suffer great changes and frequent deteriorations, when propagated by seeds, I have nevertheless considered it important to investigate the following problems, viz:

First, whether any varieties, valuable for wine purposes, will produce from the seed a fair proportion of fertile vines, bearing fruit of average value for wine making and in average abundance at an early age.

Second, whether such varieties obtain by such propagation any increased power of resistance against phylloxera, or other diseases.

The answer to the latter question appears to be anticipated prematurely by certain French authorities, who assert that seedlings of the *Vitis Vinifera* succumb to the phylloxera as readily as rooted cuttings, or layers. I think this is premature, because the field of experiment has been too limited. One theory is that the phylloxera is a natural parasite of the vine developed into epidemic character by conditions of culture, favoring disease; which conditions might not have existed if vineyards had generally been planted with seedling roots. The failure of the normally healthy seedling to resist epidemic attacks is not a reason for supposing that the epidemic would have been the same had all the vineyards been of seedling growth. However, this question is too problematical for dispute; it is open for experiment only. Nevertheless, I have considered the first question as opening a more important field, less troubled with doubtful theory. I have proved to my own satisfaction with seedlings of the *Vitis Californica* that their roots were more normally developed, sounder and suitable for sustaining plant life than the less perfect systems produced from cuttings. In this respect I look upon the seedling coming from seed of a pure unhybridized, or not exhausted (effeminate, so to speak) stock, as a plant superior in native power to a rooted cutting, whose ancestral vitality has been drawn through countless millions of cuttings from one seed planted centuries ago. Now, therefore, if it can be determined that the Zinfandel, Riesling, or other varieties, will reproduce themselves in fair average and proportion by seedlings, the infertile, or deteriorated plants of which may be grafted, I hold that a vineyard of such seedlings would be more reliable in point of general vigor, health and vitality than the ordinary plantations and would at least resist disease longer than others, if not entirely. Therefore, whether phylloxera proof or not, I have felt it my duty to impress upon viticulturists the importance of experimenting with seedlings to ascertain which varieties most nearly and in greatest proportion reproduce themselves from the seed. This being known, starting points for seedling vineyards would be obtained. It is impossible to obtain anywhere at present reliable information on these points. I have, however, written to our intelligent United States Vice Consul at Bordeaux, Mr. L. A. Price, requesting him to ascertain whether any recent discoveries have been made in this direction. He has replied that most of his inquiries remain

yet unanswered. The accomplished Doctor L. Micé, who is celebrated in Bordeaux for his viticultural researches, replied to him verbally that all the questions submitted could not be conscientiously answered, and in writing, as follows:

[Translated.]

BORDEAUX, Dec. 7th, 1880.

MR. L. A. PRICE, *Vice Consul:*

DEAR SIR—I promised you to reproduce in writing the information which I verbally gave you on reflections and observations, concerning seedling vines, which have been made in our Society of Agriculture. I now perform the promise.

FIRST—SEEDLINGS OF FRENCH VINES.

The anti-phylloxerists reason as follows: "The phylloxera, like the oidium, the anthracnoze and all the other plagues of viticulture, only attack our vines because they are enfeebled by pruning, excessive culture and all the other agricultural methods, having for their object the enormous augmentation of quantity or quality of products. Among these methods is the constant multiplication of individual plants by cuttings—by organs of vegetation. This is not the normal mode. Let us return, at least with long intervals, and for the present there is only time enough, to natural reproduction—reproduction by seeds—and we shall give back to our vineyards the rustic vigor (and in consequence thereof the resistance) which a long degeneration has caused them to lose."

Mr. Alexander Knyasoff, Professor at the School of Horticulture and Viticulture of the Crimea, who, sent to Europe by his Government, passed several months in Bordeaux in 1877, reasoned a little differently in a work written in Russian, but communicated (after translation) to our Society of Agriculture: "The *phylloxera gallicole*," (gall louse) said he, "is the phylloxera type; not being able in Europe to live on the leaves, it seeks that which is more analogous, that is to say, the rootlets, produced from the evolution of subterranean buds of our cuttings. If, instead of these rootlets, which, according to botanists, are only leaves modified by surroundings, there were formed a system of true roots, that is to say, the last ramifications of a stem produced from the growth of the embryo root germ, it would be a question of an organ, more resistant, and, being incapable of sucking its nourishing sap, it would perish of inanition. It is necessary therefore to regenerate our European vines by seedlings practiced during several generations and, aided by a good selection, and, when vigorous plants shall have been thus produced, we may graft with the most improved stocks, to preserve to our vineyards their acquired qualities."

Two essential points of this system remain without demonstration: 1st, the impossibility of the *phylloxera gallicole* to live on the leaves of our European vines; 2d, the supposed difference of the anatomical constitution between the roots of cuttings and those of seedlings.

But let us pass theoretical considerations and observe facts. M. de Sonneville, Vice-President of the Society of Agriculture, has produced an important seedling vineyard on his estate of Latour—Gueyrand, in the Commune of Ste. Eulalie d'Ambarés, and we know with what care this expert viticulturist treats all that he does. The results obtained by him were, for a long time, announced to the public in a contradictory manner. M. Laliman declared them to be disastrous. M. Trimoulet said, on the contrary, that they could not be more conclusive in the point of view of increasing resistance. I profited, on the 10th of March, 1878, by the simultaneous presence of Messrs. Trimoulet, Laliman and De Sonneville, at a meeting where I presided, to ask of the last named to decide between the statements of the first two, and Mr. de Sonneville then solemnly declared that, at his place, in the midst of the phylloxera, the seedlings had not shown any worse or better results than vines from cuttings, or layers. This affirmation was recorded in the report of the reunion, by two secretaries of the Society of Agriculture, to the reading of which all the interested parties were invited.

SECOND—SEEDLINGS OF AMERICAN VINES.

A regulation of France, with respect to phylloxera, was proclaimed in October, 1878. Our districts were divided in respect to the exchange of suspected debris of vines, as follows:

Districts very much infected; free importation, but without the right to export the debris of vines, or stakes, except into districts of the same class.

Districts moderately infected; too sick to be authorized to export everywhere, but still curable, or appearing to be such, and consequently not permitted to import except from districts free from disease, or reputed such; in such districts there is liberty of exchange from one commune to the other.

Districts little infected; subjected to the same laws as the preceding class, regulated, however, by the prefect in their internal exchange from one commune to another.

Districts uninfected; authorized to export freely, but importation necessarily strictly regulated.

Our Department, for example, is divided by the Garonne and the Gironde, in two parts, subjected to rules very different; all the right bank is classed under the first category, that of districts very sick, and enjoys, therefore, entire liberty of importation; but the right bank, infected in a less degree, is deprived of the right of receiving the organs (cuttings, roots, etc.) of vines subject to suspicion, such as the Barbeaux and American plants; so that the vine-growers of the districts of Bazas and Lesparre, that is to say, the producers of the finest white wines in the world, and of red wines also, classed among the best, cannot think of reconstituting their fine vineyards except by cultivating seedlings of American vines (the importation of seeds being permitted in all places) with the hope of grafting them in future.

But the seedling generally is uncertain, for if even the plant is known from which the seed comes, it is not known what the father was (whence came the pollen). And, the offspring having in general the qualities of both parents, a seed procured from a resistant variety may easily produce in germinating a plant less resistant, or having even lost all resistance.

Thus there is an impassable barrier for the proprietors of those unhappy districts, which are "neither flesh nor fish," which are sick, but not entirely ruined; it seems that they have only to await extreme disaster, and no one can bring aid to them until they are entirely lost.

Such was, at least, the situation two years ago. Happily, Dr. Engelmann, a celebrated American botanist, has established the complete absence of the *vitis Labrusca* (the only American species not resistant) from the forests of the Mississippi Valley, so that the seeds gathered in that region, whether coming from pure resistant species, or from hybridization between resistant species, must consequently furnish in either case resistant plants. Therefore, in sending to Europe seeds of the wild vines gathered in that valley, it will be permitted to each, even in districts yet uninfected, to prepare, from necessity or precaution, good grafting stocks.

In 1880, in conformity with these principles, Dr. Engelmann sent to M. Millardet, Professor of botany to our Faculty of Science, seeds gathered from the *Vitis Aestivalis, V. Cordifolia, V. Rupestris, V. Riparia,* and the latter distributed them at a very reasonable price. I bought some of these seeds and germinated them last spring; they have grown well, but I do not know that their roots will be resistant, having not yet, on my estate (situated at St. Pierre de Mons, Canton de Langon) discovered the presence of phylloxera. Mr. Laliman contests the fact that forms the basis of Dr. Engelmann's theory.

Such, my dear Mr. Price, is what I have had to say, or to establish myself, concerning seedling vines, whether in the body of the Society of Agriculture of the Gironde, or of diverse phylloxera commission (or rather anti-phylloxera) where I have participated. I shall be happy if my communication may be of some use to you.

Meanwhile accept my most distinguished and devoted regards.

DR. L. MICÉ.

This valuable letter, having been obtained through the courtesy of Mr. Price for the use of this Board, I take pleasure in translating in full and literally. The extreme conservatism of the French savans respecting any innovation in the methods of agriculture offers no proper ground for discouraging us from pursuing the investigation of seedlings. What he feared respecting the use of seeds of wild vines need not be feared by any one who knows that his seeds come from a district where the pollen of non-resisting vines may not have impregnated the flowers of resisting vines. I had this precaution in view last year when I commenced to gather seeds of the *Vitis Californica*, in Lake County, at a distance from any cultivated vines. Our French friends should know also that the California wild vine is purest of the pure, having no neighboring wild vines of other species to hybridize them. We may expect through seedlings of our wild vine to obtain plants as pure in stocks as their parents.

THE GALL LOUSE IN ARIZONA.

I have received a specimen of leaves of a wild vine, growing about sixty miles from Tucson, Arizona, affected by the gall louse *(pemphygus vitifoliae)*, a perfect counterpart of the leaf illustrated by Professor Riley, and submitted in the report of your Phylloxera Committee. It was presented by Mr. Bell, editor of the *Merchant*, and obtained by him from Dr. Howard. This insect, claimed to be identical with the *phylloxera*, attacking the leaf only, appears not to have been able to live on the root; at least it is a sign of a resisting variety, or species, when it is found on the leaf. It is not found on leaves of the *viniferas* which succumb to the root-inhabiting type. In this connection, it should be said again, that all cuttings and roots of Eastern, or European vines imported, should be thoroughly disinfected, and all wrappings burned to prevent importation of disease, , There is not much danger of importing the insect on cuttings, but there is some; rooted vines are especially to be feared. How to disinfect cuttings is a problem to study; but in the absence of any better recommendation, I would advise immersing the bundles, as soon as received, in a strong solution of blue stone, for a short time, after which they may be washed, or soaked in pure water. This precaution would be well to adopt with *all* cuttings, no matter whence they come, to disinfect them of any possible insect, and more particularly fungoid germs. I think it would be better to propagate the phylloxera-proof stock, especially the pure, wild species, by means of seeds rather than by imported cuttings. I have ordered a considerable collection from Missouri and Texas for this purpose.

THE VINE OF SOUDAN.

Mr. Price, our intelligent Vice-Consul at Bourdeaux, who has not lost the usefulness of his journalistic pen in consular service, sends, also, an account of a conference with M. Lécart, under the auspices of the Society of Commercial Geography of Bordeaux, which took place last month. According to the *Gironde*, M. Lécart is a well known botanist, who was sent to Senegal, Africa, with a mission of the Ministry of Public Instruction, to study the vegetable wealth of the valley of the Niger.

Having started from Medina, the 1st of last May, M. Lécart and his assistant, Mr. Durand, were to go to Segou. They directed their course to the north, towards Kouniakary, where they learned of the revolt of the Bambaras against the Sultan

Ahmadou, and a little while later, from Dr. Bayol, who had succeeded in making his escape, of the unfortunate result of the Gallieni expedition. The two botanists were compelled then to approach the French posts and they stopped at Koudian, near King Diango, and resolved to spend the Winter profitably in studying the flora of the valleys of Bakhoy and Baffing.

In proportion as the region traversed was arid in going over it, it was on the return trip changed in appearance by the first rains; everywhere verdure, plants springing from the earth, and, among them, in this forest of Koudian, between the 12th and 13th degrees of latitude, an unknown specimen. M. Lécart devoted himself to study its development, and, very soon, its bloom did not permit any doubt; it was a vine springing from a bulbous root. However, he was unwilling to give to the public this strange discovery without first making sure of it, without having gathered and eaten its fruit.

Meanwhile, he took notes at the peril of his life. Diango refused him nothing, except the privilege of writing. The rumor was circulated that "the French were writing about the country to come and take it forthwith." Nevertheless, it was necessary that the ministry should be informed of the discovery and Diango wished them to mount guard over the writing case of M. Lécart so as to review his report. But, the report being finished, it was a question how to send it. The young and energetic co-laborer of Mr. Lécart, M. Durand, took charge of it and succeeded in placing it in good hands.

To the flowers succeeded sweet and exquisite fruits, and after that there was no room for hesitation; the tuber was an annual vine, which, in the dry season, lost its leaves and wood to produce them anew in the rainy season. The canes, which we have seen in the herbarium of M. Lécart, have some similarity with those of our European vines, although in appearance less woody.

"This vine," M. Lécart declares, "may be acclimated everywhere, even in Siberia." As it only leaves a tuber in the soil which requires only three months of heat to produce, it will give fruit anywhere; the botanist, who has lived successively in Senegal, New Caledonia, Cochin-China, etc., guarantees this. Without doubt there will be some disappointments before experience has taught the necessary methods, but this is equally true of all essays.

M. Lécart had taken plants and seeds; unfortunately the asses, which carried the former, were drowned in a morass, and he only saved the seeds, which, in two years, he affirms, will have germinated and given fruit. We ardently hope that his belief will be realized.

M. Lécart defends himself with spirit against the charge of having desired to make money out of his discovery, as he had been reproached at the Academy of Sciences. He could not yet dispose of anything before the ministry had passed upon his mission. However, he proved how much the notoriety of his discovery hurt his feelings, since he had given such minute details of the places of the production of the annual vine and had named the people of the country who had aided him.

The *Gironde* says, "we regret that space and time prevent us from making a full report; but the *Bulletin* of the Commercial Geographical Society of Bordeaux will certainly publish a more complete study of this interesting question."

I have requested our able Representative in Congress, Hon. Horace Davis, to whom we are indebted recently for a consignment of choice vines from the Department of Agriculture, to interest the Commissioner of Agriculture in this matter and to procure, if possible, specimens of the seeds obtained by Mr. Lécart.

LOCAL POINTS OF INTEREST.

During the past season I have personally studied the important vineyards in every section of this State, excepting those of El Dorado County, being thereby enabled to form comparative opinions. I am convinced that in the southern part of the State, and in the foot-hill regions of the Sierra Nevada, the chief defect to be remedied consists in the selection of vines. Mr. Rose has demonstrated with his *Blaue Elba* variety, that the South can produce fine light table wines. Capt. Packard, at Santa Barbara, demonstrates that near the coast, beyond Point Concepcion, the vine flourishes and produces very light wines of fine character. The use of the *Mission* grape, except for "hot" wines and brandies, generally is a detriment to our viticultural progress. This is especially true of the El Dorado district, which is capable of producing exquisite wines, but which now retards the popularity of this industry by producing wines unfit generally for anything except dessert use. Some of our "Temperance" advocates quote quite liberally the results of wine drinking in the mining counties, as arguments against the production of wine; these results will not be so apparent when wine suitable only for the liqueur glass, or the still, are less common. I have never known any one, except some of our hardy Portuguese and Italians, to drink wine habitually from the Mission grape, without complaint against its fiery effects. There are other qualities of wine besides its alcoholic strength which make it heady in certain cases. Experience shows that they exist before the chemist applies his art in analyzing them.

The distinction between "hot" and "cold" wines should be made as soon as possible; the former should not be encouraged as habitual beverages, and the grapes that produce them should be diverted to the production of liqueur wines and brandies rather than to imitations of clarets, hocks and sauternes. No wine that requires alcohol to keep it, should be tolerated as a table drink; and none that produces dizziness or headache, should be even excused. The distilleries afford ample outlet for such productions. It should be remembered, however, that imperfect fermentation together with the over-ripe condition of grapes when gathered, is often to be blamed for the injurious effects of such wines. Our Italian and Portuguese vintners are fond of such drinks, which seem to agree with them, while they are poison to the Anglo-Saxon stomach and brain. The latter must be careful to drink only dry, well-fermented wine, and in certain districts, German and French methods are required before the people generally can afford to take to drinking local productions.

Two important districts, which promise to equal the best in the State, remain almost entirely neglected, viz: the counties of Lake and San Diego. Lake County is certainly destined to become famed for its clarets and light white wines. It is, I believe, the true "Rhine" district of California. San Diego possesses some characteristics unlike those of any other part of the State; it has the foot-hills of the Sierra Nevada with a sea coast climate tempered by soft breezes.

The climate of the southern counties is very much misunderstood by all who

conceive that frequent failures in cereal crops mark a place as sterile. Southern California is not as sterile and dry as the Mediterranean coast of France. While in the Departments of the Midi, in France, only the olive and the vine are very successfully cultivated, wheat and other cereals being failures and irrigation impracticable, our southern counties produce also the orange, lemon, lime, as well as fair average returns of cereals and excellent tree fruits, such as apples, pears, apricots, etc. There is no part of southern France that is so favorable for vines and olives as our southern coast. The red soils of San Diego have been demonstrated recently to be suitable to profitable culture of the vine without irrigation. The fruit is luscious, fragrant and beautiful; lands are cheap and success is certain to those who intelligently select their vineyards and carefully cultivate them. San Diego may confidently expect to become the Marseilles of California and Los Angeles its Lyons. I feel also that it is important that special attention should be given to the region lying about the head of navigation of the Sacramento river. This, too, has been neglected, notwithstanding, as far north as Shasta, there is every reason to believe that grand results may be attained.

We may claim the privilege, by reason of our close affinity, to say something of Arizona. I have already learned enough by studying samples of must from the wild grapes to predict that in the vicinity of Prescott viticulture will become profitable. This is probably true of places near Tucson. The region for the culture of the *Vitis Vinifera* extends through Arizona, also into New Mexico. Our Arizona neighbors will do well to experiment carefully with the culture and improvement of their best varieties of wild vines, but they should avoid the addition of sugar to the juice, aiming by culture to ennoble the vine.

FERTILIZERS.

Our viticulturists are beginning to study seriously the subject of fertilizing vines. I think that it is therefore most important for them to investigate fully the relative values and defects of the different forms of manures, viz: organic and inorganic. I believe that there are many good reasons for condemning the use of decomposing vegetable matters and for favoring the reduction of all fertilizers to inorganic conditions before applying them to the soil. The healthy vine needs principally phosphoric acid, potash and lime; the diseased vine, especially when attacked by phylloxera, needs also ammonia to stimulate the root and cause growth. Bones and wood ashes, reduced with sulphuric acid, will probably supply the best stimulus and plant food. The bones being crushed and acted upon by the sulphuric acid, sulphate of lime (gypsum) is formed, the phosphoric acid uniting with the potash of the ashes, forming a phosphate which is readily taken up by the plant.

I think that we have much to dread continuously from the various forms of fungus, and should avoid harboring the germs among the vines in any way. Decaying vegetable matter must favor fungoid developments; and I would advise annual cleaning of the vineyards—debris of leaves and canes being carefully raked together and burned. Where mildew, or other fungoid disease has appeared, I would, after pruning, scrape the bark and wash the vines with a strong solution of blue stone; the dead leaves and waste prunings being burned, this method would nearly, if not quite, eradicate the germs of disease. By using only inorganic, or chemical manures,

the soil and vines may be kept clean. The following extract from a letter to the *Healdsburg Enterprise*, published this year, corroborates these opinions in some respects:

"My vineyard near Healdsburg is an old one, most of the vines being from twelve to sixteen years old. It has never had an ounce of manure of any kind on it since the vines were planted, until last year, and then only a few vines have been experimented on. It lies on a gentle slope to the south, and a small portion on an abrupt rise facing the south; there is a very great difference in the flavor of the grapes in the lower and upper portions. A few vines from each portion were selected and manured as follows: The first with barn-yard manure well rotted; the second with dead chickens from my yard; the third with ashes; the fourth with bones; the fifth with a mixture of bones and ashes; the sixth with chip manure from wood pile, well decomposed. It is impossible to give an estimate of the full effect of these measures yet, but this year, *i. e.*, the year the manure was applied, the result was as follows: The vines manured with barn-yard manure looked well, and the growth of cane is large. The grapes, however, did not correspond, and every vine so manured mildewed. Those with animal manure, *i. e.*, the dead chickens around them, are in better condition, but the yield does not attract attention. The ashes and bones each have given strong canes, a good yield of grapes, and the vines are very healthy. Combined they have an extraordinary effect—the vines are loaded. The chip manure has acted well, but not equal to either bones or ashes, singly or combined. One vine, manured with suds from the wash-tub, yields well, but the leaves look sickly and white."

QUARANTINE REGULATIONS.

This Board, in my opinion, cannot impress upon the State with too much earnestness the immediate importance of quarantine rules and regulations to govern—

1st. The introduction of new vines and cuttings into the State from Eastern States, Europe, or elsewhere.

2d. The distribution of cuttings and vines from one place to another within the State.

3d. The disposition of fruit-boxes and other things connected with the vineyards liable to carry infection of disease.

The disinfection of *all* cuttings, boxes, etc., ought to be made compulsory by law. We are in especial danger, now that importations of Missouri and Texas vines are becoming common.

There should be appointed competent officers to regulate and enforce such quarantine rules, as may become necessary from time to time. To such work should be added that of eradicating disease; whether this should be done under one general State management, or whether a law may be constitutionally passed authorizing local district organizations to defend themselves against invasion of disease and to eradicate it when found, I am unprepared to say. One thing however is certain that the State cannot afford to delay taking action to prevent the spread of disease, while the means of eradicating it are still being studied. The Government of the United States may be appealed to for aid; ten per cent. of the collections of Internal Revenue received from the sale of brandy stamps, would, if expended judiciously, in a short time, completely eradicate the phylloxera, provided the introduction of new germs were prevented by quarantine rules. Nothing, however, could be more unjust than to punish those, whose vineyards are infected, with the entire burden of disinfecting the State. The cost of suppressing a plague, threatening human

life, is taxed upon all, because all are interested in self-protection; the same principle should apply to vineyards, orchards, etc.; the difficulty is in devising the form of legislation necessary, so that the costs may be equitably assessed and collected. A liberal appropriation by Congress of part of the Internal Revenues collected from brandies in this State to be used in preserving its sources of revenue, would relieve the question of much of its difficulty, provided the State will create officers to do the work and give them power to act and enforce strict laws.

WINE, AS RAW MATERIAL.

Concerning the wines produced in our vineyards, generally speaking, they can only be considered as raw material for the large dealers to work over in blending vats. Only a few produce wines of much value to consumers or retailers. This is not so true of white, as of red wines. California producers cannot expect to obtain much individual celebrity for their claret and burgundy types, until they have assorted their vines of proper varieties in just proportions so as to accomplish, when they rack their musts from the fermenting tanks, or pipes, what they now leave for the dealer to do. None of the celebrated French wines are the products of single varieties of grapes. Knowing in what proportions the musts of different grapes must be blended to produce perfect and agreeable wines—aroma, bouquet, color, strength, acidity, smoothness, freshness, etc., all being considered, the French vine-grower cultivates all varieties in the proportions required. Generally the different varieties ripen at different times and must be fermented separately; but they are racked off together and left to go through the after fermentation in close union, thereby perfecting the blends.

It is true that it has been better to keep the wines of the different grapes separate at the vineyards in this State, because the varieties cultivated ought not to be mixed, or are not in right proportions. The fine art of blending must be studied by the producer, if he expects ever to achieve distinction for his products. I have advised certain people in San Diego County, to try the combination of two-fifths Zinfandel, two-fifths Charbono, and one-fifth Grenache. Mataro and Carignane have also been suggested to take the place of part of the Charbono and Zinfandel. Great finesse can be acquired only by long experience; the cellar master of the large dealer, who handles raw material from all parts, will be able to give sound advice as to the selection of varieties and their proportions in given districts.

I have also called the attention of southern growers to the lack of California wines of the Sauterne type. We have succeeded in reproducing the Rhenish type with the Rieslings, Burger and Blaue Elba; the Chablis with the Gray Pinot; but only one vineyard yet produces the Sauterne. The varieties necessary for the Sauterne must be sought for among the characteristic vines of the white wine district, near Bordeaux, chief among which are the Sauvignon (*verte* and *blanche*). Moreover, inasmuch as experience in Europe shows that the aromatic Rieslings lose their virtues in southern latitudes, while the Sauvignon flourishes in the south of France, we may expect better results with the latter blended with neutral Burgers and other appropriate white wine grapes in our southern counties than with Riesling. The market, moreover, requires Sauternes as well as Rhine wines.

The market for our fine Zinfandel, in places where the taste is cultivated for

French claret and Burgundy types, would no doubt be increased by a judicious blend with favorite French varieties, such as Charbono, Grenache and Mataro, which, while not the finest of French grapes, are leading stocks for esteemed wines and are good bearers. The shy bearers, which produce grand French wines, may be experimented with at leisure after the market for ordinary table wine has been satisfactorily supplied.

CLASSIFICATION OF CALIFORNIA WINES.

It is impossible yet to make a fair classification of California wines; in the best districts, varieties of vines are still cultivated, which deteriorate the quality of their characteristic products; in few vineyards are there any carefully selected proportions of different varieties suitable to be blended after racking from the fermenting tanks; and in most places, it may be fairly said that the cultivation of the best varieties suited to climate and soil has scarcely been begun. Few vineyards are therefore capable of turning out completely blended and perfect wines. The scarcity of choice cuttings has frequently compelled the vigneron to plant whatever could be found most conveniently; much however is to be blamed to the lack of enterprise in procuring at some expense from Europe the requisite varieties. The collection made by Col. Aguston Haraszthy has not been preserved; the names of varieties have been confounded in many cases; and there is now a pressing need of a new and complete collection.

In respect to varieties of Rhine wine grapes our State is best supplied; our *Rieslings, Gutedel, (Golden Chasselas) Blaue Elba, Tramaner* and *Burger* have won the first place for our white wines, because

1st. We have complete selections for judicious blends;

2nd. These varieties have fortunately been planted where they are best suited in climate (with few exceptions), viz: on the northern limit of viticulture.

In respect to Sauterne varieties, we have only one fine collection and that is incomplete, viz: at the vineyard of Chas. Lefranc, in Santa Clara County. He has, however, the genuine *Sauvignon verte* and *jaune*, which imparts the characteristic aroma of the Sauterne wines. I think that in the coast counties south of the Bay of San Francisco, this variety should be largely cultivated, viz: about one-third of each white wine vineyard should be of this stock, the balance (in the absence of *Semillon, Chalosse, Muscadelle*, etc.) being made up in due proportions of *Blaue Elba, Golden Chasselas* and *Burger.*

In clarets, we are notably deficient, notwithstanding the glory of our *Zinfandel.* The *Zinfandel* is not a French wine grape and fails to fill a certain market demand, and in many cases wants some companion in the fermenting rooms. The mixture of the *Zinfandel* (Hungarian) with *Malvoisie* (a port wine grape), which is so much practiced in Napa County ought to be discontinued, as soon as other varieties of finer quality can be substituted for the *Malvoisie.* I have yet failed to find good reasons, excepting the scarcity and high price of cuttings, for the neglect to sufficiently cultivate in all the Sonoma and Napa vineyards, which can nearest approach the Bordeaux, the varieties which give character to the finest Bordeaux red wines. The *Carbenet Sauvignon* and the *Malbec* have been too long ignored.

We have no Burgundy plantations. It is too commonly the custom to call all heavy clarets Burgundies. The true Burgundy is the product chiefly of the

Pinot family of grapes, just as the Rhine wine owes its reputation to *Riesling*, and Sauterne to the *Sauvignon*. In Santa Clara County is found a vineyard succeeding in reproducing the Santerne type; but many places falsely naming their products Burgundy. The *Charbono*, *Trousseau*, *Grenache*, *Carignane* and *Mataro* are not Burgundy grapes. The only true Burgundy grape in that district is one that is mis-named a *Riesling*, viz.: the *Pinot Gris*, called generally "Gray Riesling." The *Charbono* and *Trousseau* are leading varieties from the Jura District of France, the wine of which ranks nearly with but inferior to Burgundy. They need, however, the *Poulsart* to complete their blend. The *Grenache*, *Carignane*, and *Mataro* are the leading varieties of the Roussillon District, in the South of France, at the foot of the Pyrennees. They produce wines here of great value, as they do in France, where they form the foundation of wines of exportation. They should be largely cultivated in our southern counties.

It should be admitted, however, that, as Sonoma and Napa counties have the best collection of German grapes, and the largest plantations of *Zinfandel* (Hungarian), Santa Clara takes the lead in French varieties, which, however, are not in sufficient quantity to satisfy the market. Mr. Lefranc has, also, the only considerable plantation of *Carbenet*, which ought to be propagated in place of *Malvoisie* in Napa and Sonoma, with *Malbec* and *Zinfandel*; *Charbono*, *Mataro* and *Zinfandel* will also be fine for those two counties. The *Mataro* is there mis-named the "Upright Burgundy."

In sherries we are also deficient. We have no plantations of true sherry grapes, unless the *Mission* is one, as some suppose. In our southern counties, the Sacramento and San Joaquin Valleys, true port and sherry producing varieties should be propagated. There is too much carelessness and false economy in selecting varieties, when planting. Generally the "fever" strikes the farmer about January and too late to make proper selections, often he is too careless to make at least a small start with proper selections, from which he may propagate cuttings hereafter.

These remarks pertain to types of wine resembling, by reason of the characteristic aromas and flavors, those of celebrated European districts, which can only be reproduced by selecting the proper variety and climate adapted to it. I believe, however, that important modifications, caused by peculiarities of soil and climate, and the cultivation of varieties in unaccustomed conditions, will be discovered that will eventually result in peculiar California wines of great merit. This we may expect especially from the El Dorado District, or Sierra Nevada foot-hills, portions of the Sacramento and San Joaquin Valley, and such southern counties as San Diego. Thus far, however, all our wines that have made reputation for us, have done so by reason of their similarity with European wines, which has generally been due to the proper selection of varieties. The *Zinfandel* is the only notable exception; although Hungarian, it is more known now in America than in Europe, and is the beginning of a new type of which we may be proud.

Many of the varieties we need are now being cultivated in small lots in the State; more attention should be paid to propagating them in the right places.

It is folly to think that good table wines cannot be made south as well as north; but it is equal folly to expect one variety of grape to do it all. Good clar-

ets are made in parts of Spain, as well as in France. Dry sherries, as light as Rhine wine, are made in Spain; samples of such, Manzanillas, are in San Francisco now.

In ports, it is folly to think that we must only imitate the cargo wine of Cette and Oporto. Why can we not enjoy port by the bottle as well as the glass? It is only the barbarous mixture of half fermented must, syrup and corn spirits, which most physicians ignorantly recommend to feeble patients under the name of port, that has heretofore been imitated here for drug shop and bar-room sale in any considerable degree. We can produce delicious dry ports, as well as wholesome clarets and as innocent; we do produce them in small lots in one hot valley, but the trade has no demand yet for such superior wines—only for drug-shop mixtures.

One of the curiosities of the year is the seedless Sultana wine—a small lot fermented as an experiment by Mr. Blowers. The result has verified the predictions of its friends. This variety, besides being so valuable for raisin making, will be a leading wine grape.

A brief discussion of these topics serves to demonstrate incidentally the great necessity of an experimental vineyard, where all varieties of vines may be propagated and experimented with for the public benefit by the State.

COLOR IN WINE.

Experience has proved that red wines—dry and sound—are the best for regular consumption; this has created for them a popularity which has produced an attendant evil in France. Most of the deleterious adulterations are practiced in coloring wines, to cover mixtures of white with red, or water, or to bring up the standard of light color.

It is fortunate for the American drinker that he has not yet learned to be foolishly fastidious on the point of the shade of color. Vintages vary from year to year in depth of color; but consumers should know this and not make foolish objections, which tempt the dealer to correct such defects as may appear by the addition of chemicals. Wine producers in the country are always trembling, when the wine dealer comes along, lest he should complain because "the color is too light," as it generally is in the vintage of 1880. I have taken pains to ascertain whether there are any just grounds for the common practiceof reducing the price a cent or two a gallon because the color is a trifle light. I do not find consumers at the private table complaining about color. Experienced dealers tell me that the only complaints come from retailers, such as French restaurateurs and small dealers, who buy by the cask and sell by the gallon. They complain, if the color is not dense, because it is their practice to water the wine to make it taste like French *vin ordinaire* and to enable them to sell cheaply, and if the wine is light in color their practice will be betrayed. Hence the temptation to artificially color wine is felt. The public should learn to buy their wines at fair living rates and do their own watering, or if served with cheap wine, not to complain of lack of color.

Whenever the great dealers complain at the vineyard about light color, it is either an excuse to demand a lower price, or in the interest of peddling wine sellers, who water their wine as others water milk (in the one case making use of red dyes and in the other of chalk, or magnesia); for their legitimate consumers do not trouble themselves much about it.

There are valuable grapes which give deep color, such as the *Charbono*, but that is not their chief value except to the small dealer, who waters his wine.

FRENCH WINE IMPORTATIONS.

The increased importations of wine into France tell terribly the story of the havoc that has been created by the phylloxera. Mr. Price sends me the following statement of importations at Bordeaux during 1879 and 1880:

1879.

From Spain	27,378,707	litres.
" Portugal	149,507	"
" Austria	32,290	"
" Italy	40,565	"
" Ottoman Empire	2,642	"
Total (in litres)	27,603,711	

Equal to 7,287,376 American wine gals.

FIRST NINE MONTHS OF 1880.

From Spain	51,641,096	litres.
" Portugal	1,087,764	"
" Italy	1,408,490	"
" Austria	512,640	"
" Turkey	856,861	"
Total (in litres)	55,506,851	

Equal to 14,652,000 American wine gals.

This shows a remarkable increase for 1880 for the single port of Bordeaux, and also the basis out of which the "Bordeaux" wines for exportation are prepared.

A REFORM STEP.

Owing to the curiosity excited during the inception of wine making by the novelty of wine cellars, and due to the hospitable character of our people as well as their pride in new enterprises, the habit of using wine cellars for the entertainment of guests became unfortunately too common. It is beginning to become well known. however, that it is "unprofessional" to "treat" in a wine cellar. Those who visit it have properly only one object in view—the study of the business and its products, Neither of these objects can be accomplished while wine drinking, and guests ought to remember that they never can offend a good cellar-master by declining to *drink* the wine which he offers them to *taste*. If any one desires to drink wine, or any host desires to entertain friends, the lunch or dinner table, is the place for indulging while eating. The man who visits a wine cellar to *drink* wine, proves by his actions that he knows nothing of his opportunity for study; and the host, who insists on his drinking makes himself liable to the suspicion that his wines will not stand critical tasting. In a few places, wine cellars are partially converted into retail saloons fre-

quented by the multitude; nothing can be more injurious to the best interests of the viticulturist than this practice of encouraging wine tippling. It should be discouraged in every way. The place for wine is on the table at meals; the doors of the wine cellar should be kept closed to keep the wine in good condition for the table. The cellar master should have more important duties to perform than bartending.

When wine cellars cease to be novelties and professional pride increases with cellar masters, these evils, which cause nearly all the complaints against wine making, will disappear. It will be a good time then for the good natured proprietor, who now too often drinks his own wine in keeping company with his visitors, at times when his stomach rebels against the practice.

THE WORST ENEMIES OF CALIFORNIA WINES.

I find that of all the inquiring world, those who take the least interest in discovering and making known the excellencies of our best vintages, are American hotel-keepers, restaurateurs and other retailers of "fine wines and liquors." During the past Summer I have met, visiting this State for the purpose of investigating and reporting upon the merits of our viticulture, Professor de Savignon and Mons. de Lacretelle, representing the French Government, Mr. John Clay, representing the British Government, Mr. Forester, of London, whose vineyards are in the Douro, Portugal, Mr. Nedecsky, proprietor of a great vineyard in Hungary, and a gentleman whose name I have unfortunately forgotten, correspondent of Herr Babo's celebrated *Weinlaube* of Germany. All of these gentlemen came here, previously convinced that good wines were being produced in California, with the promise of grand vintages in future. I have seen four orders from leading London wine houses, addressed to their agents in San Francisco, inquiring concerning the practicability of importing our best wines into England. With very few exceptions, however, could any of these gentlemen, or their representatives, obtain any reliable information concerning native wines at hotels, restaurants, or other places of entertainment, where the best collections of beverages are pretended to be kept and honestly labeled. Mr. Nedecsky's first experience in New York, as he related it to me, was only a sample of the experience generally of all travelers. He asked for a bottle of good American wine. The answer was, "We never keep American wine; there is none fit to drink." Each of the visitors named, however, assured me that they found, after being piloted by a guide in this State, that we were producing many wines not only "fit to be drunk," but fit for any gentleman's table in England or Europe. Others. who have not investigated as closely as they have done, have failed to discover the true reasons for the apparent prejudice of retailers against American brands.

The State of California exports to the Atlantic coast as much wine as is imported into the whole country from France, and consumes herself, of native production, three-fourths as much as is imported into the entire United States from all countries. Somewhere this wine is drunk; where is the trifling importation of French wines drunk in this State? Of course the people know all about false labels by this time.

The county of Napa produces as much wine, and good wine too, as is imported

into the United States from France; yet recently I was told at the Palace Hotel, in Napa City, that they had no California wines, and I was offered a spurious imitation of Chateau Margaux, when I called for Zinfandel. I had the same experience in Petaluma at a leading hotel, in another of our leading wine districts. A few days ago, I asked at a city restaurant: "Have you any California claret?" "Yes," said the waiter frankly, "but under French labels."

There are several reasons for this American hostility to American brands:

First. The consumer, either from snobbishness, preferring anything foreign to anything American, or ignorant, because his wine-drinking has been confined to public hostelries, where he has been taught to believe that all the good wine and brandy is foreign, does not insist upon being served with good native wine.

Second. Because the usual practice of demanding high prices for cheap wines, covered with celebrated foreign labels, which returns so much ill-merited profit, could not be maintained by the hotel-keeper, or restaurateur, if he professed to furnish native wines, which are known to be cheap.

Third. Because, encouraging the free use of good cheap wine at the table would materially reduce the profits of the bar-room, which is an important adjunct of nearly every hotel, and of the cocktails and toddies served at small restaurant counters.

Fourth. Because few even of the hotel keepers, restaurateurs and saloon-keepers have any true knowledge of the best California vintages, and take little pains to learn, preferring with stolid stubbornness and pretense of being "posted," to pay importer's prices to jobbers and traveling agents for supposed foreign wines and brandies, rather than to purchase the same goods as native productions, at reasonable rates. Few of such retailers are willing to trust their own palates in selecting wines, but rely upon foreign names and high prices to ensure them the "fine wines and liquors" which they advertise to sell.

The consumer may overcome his snobbishnesss and ignorance and learn to know a good wine without a label, and a poor wine with one; the retailer may also in time, if he does not drink too much whisky, learn how not to be imposed upon, and how not to impose upon himself; but the selfish interest of those who try to maintain fancy prices by means of false labels, or the profits of the bar-room by keeping wine too expensive for table use, must be overcome by either the active complaint and rebellion of their customers, or the active competition of honestly dealing retailers.

Wine drinkers—those who prefer to use wine in preference to other table drinks, and to avoid cocktails as appetizers and punches as digesters, have good reason to complain at any hotel in this State if they are not treated as fairly as the coffee or tea drinkers. A pint of good wine can be furnished at any restaurant, with profit, at the price of a cup of coffee, or tea—twelve and a half cents; and at the hotel, without extra charge, to those who prefer wine to other drinks. The people should know that the trade price of good ordinary clarets and white wines, at which hotels can be furnished, is from forty to sixty cents per gallon—ten "pint" bottles to the gallon, at from four to six cents each. Bottles are only a first cost, because they are refilled from the cask, and the cost and labor of serving wine is not as great as that of attending to the coffee and tea pots, milk cans, cups, sugar bowls, spoons and goblets.

A pint of claret may be served at the price of a cocktail, the cocktail dispensed with and the bar-room converted into a café. There is nothing wanting, except determination on the part of consumers to insist on fair treatment, to effect a great social reform, and discrimination that will compel poor wines, of which there are many, especially those of the Mission grape, to be sent to the distillers.

THE TEMPERANCE QUESTION.

I had intended to prepare a report upon wine producing and drinking in its relations to temperance, for which I have collected valuable statistics and testimony; but I have already passed beyond the proper limits for this report. Permit me, however, to briefly state a few important points, which will be discussed in future:

The able researches of Dr. Lunier, Secretary of the *Société française de tempérance*, inspector of the insane asylums and of the sanitary conditions of the prisons of France, has shown that the ratio of percentages of disease, crime, and casualty, attributable to alcoholic excesses, decreases in proportion as in each district the consumption of wine and beer increase; that in proportion as the supply of wine, or beer, is cheaper and greater, their consumption is greater and that of spirits is less; that the evils of intemperance are worse in the districts where wine and beer are scarce (as in Normandy and in northern central departments), and spirits from beet roots, potatoes, and grain (whiskies) are used; that in the brandy producing districts, such as Cognac, where every vine-grower is a distiller, and towns are filled with workmen engaged in preparing and packing brandies, the evils of intemperance are as small as in the greater wine producing districts; that fermented drinks, containing no distilled spirits, exert different effects in respect to alcohol contained than diluted spirits of equal strength; that red wines are preferable to white; that cider stimulates the consumption of spirits; and that natural wine and beer cure the thirst for spirits, instead of exciting it. The French Temperance Society makes these important distinctions:

1st. There is a difference between spirits, and especially between good spirits and bad spirits.

2nd. There is a difference in the alcoholic nature of fermented liquids and distillations.

They aim to repress entirely the circulation and sale of bad spirits—discovering their characteristics and modes of detecting them, and formulating laws to restrain the mixture of distilled spirits with wines beyond the degree necessary to keep weak vintages, checking promiscuous tippling in spirits, punishing adulterations of wines, beers, etc., and furnishing information to lead to the detection of frauds, and encouraging the use of pure cheap wine, beer, tea and coffee, as the best means of curing public thirst for distilled alcohol. The French Temperance Society receives the hearty support of all the leading scientists, legislators and the intelligent consumers of good food and drink. Such a society in America, if organized, would receive similar support from all intelligent citizens of our country. The reports of the French Society, organized in 1873, contain nearly all that can be found of practical value to a student of these questions; science has been stimulated by co-operation and the good will of lovers of good wine and prudent consumers of pure brandy.

If our legislators would first put a heavy hand, aided by science, upon all adul-

terations and false brands, then put brakes upon the licenses to retail spirits and alcoholized wines, encourage viticulture, remove oppressive laws which prevent distillers from maturing their products, limit the number of licenses to retail spirits, so that retailers may not plead too much competition as an excuse for selling poor liquors, supervise and inspect the cellars of all retailers, where the consumer cannot protect himself from imposition, and provide ample scientific instruction so that our people may learn to know the differences between good wines and bad wines, good spirits and bad spirits;—the people, I think, will not be in danger from intemperance.

Respectfully submitted,

CHAS. A. WETMORE,

Commissioner for the State at large.

NOTE.—Since the foregoing has been in type, I have learned that there is one small plantation of *Pinot* grapes—the leading varieties of Burgundy vineyards—in Santa Cruz County. It is true, however, that there are no Burgundy plantations of sufficient importance yet to affect our stock of marketable wines materially. The *Pinots* should be largely propagated. C. A. W.

REPORT OF MR. CHAS. KRUG, COMMISSIONER FOR NAPA DISTRICT.

NAPA VITICULTURAL DISTRICT,

ST. HELENA, July 7th, 1880.

To the Board of State Viticultural Commissioners:

GENTLEMEN.—In submitting my report, as Commissioner for the Napa Viticultural District, comprising the counties of Napa, Solano, and Contra Costa, I must state that a protracted illness has prevented me from paying proper attention to its preparation.

NAPA COUNTY.

The vintage of 1880 resulted as follows:

Wine produced	2,460,000	gallons.
Brandy, "	60,000	"

The number of acres of bearing vines is estimated at 3,400.

Grapes shipped to San Francisco and the Eastern States, for table fruit, 350 tons.

Grapes produced in the county, 18,246 tons, or 36,250,000 pounds.

In 1870, according to the County Assessor's statement, there were produced—

Wine	297,070	gallons.
Brandy	3,990	"

In 1875, according to statements from Assessor's office—

Wine	716,189	gallons.
Brandy	12,500	"

SOLANO COUNTY.

Vintage of 1880 (approximately):

Wine	160,000	gallons.
Brandy	3,000	"

A very large proportion of grapes of Solano County are shipped for table use to San Francisco and the Eastern States.

CONTRA COSTA COUNTY.

No reliable returns have yet been received. I am informed that about 25,000 gallons were made, and no brandy, in 1880.

MEETING OF THE NAPA VITICULTURAL DISTRICT.

The annual meeting of the District was called, to be held at St. Helena, Saturday, December 18th, last. It was well attended by viticulturists of this and other Districts. The able address of Professor E. W. Hilgard, delivered at the meeting, is appended to this report.

PRECAUTIONS AGAINST DISEASES.

In regard to the ravages of the phylloxera in this District, I refer to the exhaustive report of your Committee on Phylloxera, Vine Pests and Diseases of the Vine. It may be interesting to mention here that the St. Helena Wine-Growers' Association is determined to cause the organization of all the grape-growers in the St. Helena District, for the purpose of exterminating the threatened pest, wherever it may make its appearance among them, viz.: by prompt and vigorous applications of the bi-sulphide of carbon, or any other remedy that may be known as efficacious. Quite a number of plantations of Missouri and Texas phylloxera-proof vines, will be made the coming spring; and, also, of roots raised from the seed of the *Vitis Californica.*

RECOMMENDATIONS.

I respectfully recommend that this Board should request the present Legislature to pass a law prohibiting the use of glucose (grape sugar manufactured from potatoes, corn, or other starchy substances) in the manufacture of wines and brandies, or to compel all parties using the same to designate to the public that their products are not from the pure juice of the grape.

I recommend, also, that all interested in grape-growing in their respective districts should organize clubs, or associations, with the object of enlightening their members and the public in all matters pertaining to viticulture and viniculture. The benefits derived from such associations are clearly stated in an address to the vine-growers and wine-makers of the St. Helena District, viz.:

"The vast amount of good the St. Helena Viticultural Association has done during the few years of its existence, cannot be doubted. It has, by publication of its minutes and deliberations, spread a great amount of information among the grape-growers and wine men of this county and State.

"It has drawn the attention of many persons looking out for vineyard land to this section, caused them to buy and settle among us and to assist the building up of our county.

"It has lent its help, and applied its influence to frustrate the immense exertions the French emissary, Leon Chotteau, made in Congress to change the specific duty of 40 cents per gallon on wine, to 25 cents *ad valorem.* If he had succeeded, our grapes would not bring more than ten dollars per ton.

"It has started an organization to keep the pernicious phylloxera from our beautiful vineyards, and you are well aware one man alone can do nothing in this line—only united action by all can ward off the dreaded calamity.

"It intends to secure great benefits to this neighborhood by collecting and publishing valuable statistics showing the superiority of our climate, the great fertility of our soil, the energy of those who are engaged in viticulture, the great demand for our cuttings, and many other points well adapted to attract culture and wealth to our district.

"Its intimate connection with the State Viticultural Commission, offers us ample opportunity, with a very small outlay, to have our soils and products analyzed, lectures given on important subjects connected with our interests, such as manuring, etc.

"It will import, or cause to be imported, phylloxera-proof cuttings from best sources of the Mississippi Valley and elsewhere. In short, our association has done a great amount of good, and properly conducted, will do much more in future for our district and wine interests, just in the proportion as we enable it by our support financially and personally to do so."

Respectfully submitted.

CHAS. KRUG.

Commissioner for the Napa District.

NAPA VITICULTURAL DISTRICT.—THE PERMANENT MAINTENANCE OF OUR VINEYARDS.

ADDRESS DELIVERED BY PROFESSOR E. W. HILGARD, OF THE STATE UNIVERSITY, AT A MEETING OF THE NAPA VITICULTURAL DISTRICT, HELD AT ST. HELENA, DECEMBER 18TH, 1880, CALLED BY CHAS. KRUG, COMMISSIONER FOR THE DISTRICT.

The first condition of the permanency of an industry is that it must be profitable. If not profitable, it will not be maintained. Heretofore there has been a great deal of loss in the viticultural industry. Why is this, and how can our vineyards be made most profitable?

I come before you to-day to consider the conditions of the establishment of the vine-growing interest upon a permanent basis—such a one as will not only enable us to produce grapes and make wine in a general way, and for the time being, but will serve our children as well as ourselves. It is the privilege of California to be the farthest of the far west—the point beyond which you need not seek—the *ne plus ultra*, in short, in the most literal sense. We are not mere sojourners—we have a goodly land, and we mean to stay.

But this imposes on us a duty, also—a duty to our children, and to those who will hereafter come to seek this land; a duty but too often shirked by those who are among the first to conquer a new soil, I mean that of working and building not only for the present, but also for the future. It would be easy to prove this position

from a high moral standpoint. But I must admit that in many places where I have heretofore tried this line of argument upon the hardy pioneer, the destroyer of the forests and the despoiler of the soil, I have not met with very marked success. Why should he who would constitutionally rather move than not, once in five or six years, care whether he spoils the soil and the climate for those who come after him? Not expecting to have any use for permanent improvements, he does not even care to hear about them, except in so far as they might help him to make a better sale when he next moves west.

In addressing the vine-growers of Napa Valley, I speak on the presumption that they do not mean to move west, or in any other direction, if they can help it. Some years ago, there were many who, in the dark hour of the industry, thought they would either have to go or change their crop. It was the time when the most profitable way of harvesting the grape crop was to turn in the hogs, while the wines of the previous years were a drug in the market and a heaviness in the hands of the dealers. That time has happily gone by; never to return unless by our own most grievous fault. The turning point of the tide was at the time when the havoc carried by the phylloxera into the European vineyard, created a panic as to future supplies; so that those who had thus far turned up their noses at the nameless and fameless American wines, were led to reflect, and at least try what could be made out of the promiscuous material, in case there should be no other available source. The fact that California is the only State of the Union where the European grape is successfully cultivated, naturally led to a closer and more serious consideration of her wine product, as not bearing with it the "offensive" odor of the native American varieties, and being, therefore, better fitted for transformation into the "old familiar faces" of the standard brands, by a little judicious blending, filling into regulation packages, and the liberal use of pretty labels and plenty of tin foil.

But is there any good reason why California wines should play second fiddle, and continued to be sold under foreign labels? I think you all believe there is none, and I feel sure of it. It is to consider how best to place this important industry upon a permanent and definite footing, how to render it self-respecting, and able to show its own face in the best company without being abashed, that we have met together to-day.

For the grape-grower, unlike the back-woodsman, plants his vines not for one, nor for five or six seasons, but for a lifetime, and expects to transmit it to his children, or heirs, or purchaser, if needs be, in the best possible condition. He is essentially conservative, and builds, unlike most Californians, structures of solid rock, or hews out cave-cellars into the mountain side. Surely, an industry requiring so many costly and permanent appliances, should rest also on firmest and best-defined commercial and technical basis. Above all, it must stand at once face to face with that bugbear of American pioneer farmers—the use of manure; and with such refinements of agriculture as clean and thorough tillage, underdraining, and other "fancy doings," which the average western farmer declares are "too much trouble, and will never pay." How it pays to lose a vineyard, your neighbors of Sonoma can best tell you. But apart from the phylloxera, you may lose your vineyard in a variety of ways. There are other insects and diseases that, if allowed to progress unchecked, may render it unprofitable, if they do not kill the vines. Above all things, the vineyard, after feeding you for a number of years, varying according to the quality of your soil, will assuredly be starved out, unless some return is made to the soil.

What should that return be, and how shall it be made most cheaply? I hope to be able to tell you that a little better a year hence, than I can now. I have only lately had an opportunity to examine your soils, and as yet no analysis of them have been made. That will be done when we get over the busy season of the vintage, and the care of the wines and their products. And that leads me to tell you, first of all, what we are doing, and intend to do, at the University, in the cause of your industry, and for what reasons. That will lead me directly to the points I mean to bring before you in this lecture.

Where does the shoe pinch? Why are California wines, as I have said and as you all know, sold under foreign labels, after two trips across the Atlantic, or even perhaps only across the Bay?—are they naturally inferior, from the nature of the soil and climate; or if not wherein is our system of making, treating and marketing wines in fault?

As to natural inferiority, where should it lie? Have we not in abundance all that the European vintner anxiously wishes for—a long season, a high summer temperature, no end of sunshine, and right here, the old lava flows of your Mount St. Helena, forming the highest class of vineyard soils—the volcanic? Do we not cultivate successfully, and to as great perfection as anywhere in the old world, every kind of grape thus far brought to California, from the old European stock to the latest evolved hybrids of the American vines?

And, you will probably add, do we not harvest ten and thirteen tons of grapes that in the old country would be thought doing well if they brought two-fifths of that amount. We do; but I apprehend that this high production is just one of the points where our advantage is not unalloyed. European vintners have long ago found out that there is an inverse ratio between quality and quantity; and they forecast and regulate with great precision for each vineyard the degree to which the quantity may profitably be increased; that is, without detracting too much from the quality. The reason why some of the first-class wines are so scarce in the market, is, to a considerable extent, owing to the fact that these highest qualities are produced only by a great sacrifice in quantity, and that comparatively few are willing to pay for such wine the price required to assure a profit to the producer.

For instance, the soils on which the "Grand vins" of Medoc and Burgundy are grown, yield without manure about one hundred and thirty-seven gallons of wine—say about one ton of grapes. This, at any price that can be obtained for the product, would not pay expenses. The yield is therefore increased by the aid of manures to from 190 to 230 gallons per acre, What do our thirteen-ton-per-acre men say to this?

The first thing to be said, assuredly, is that we have been working upon altogether a different basis from our European competitors in the world's market; and as the world is accustomed to THEIR wares, it is no wonder that ours have not been favorably received at first. How many are there here present, who have paid any attention to the segregation of the products of their best vineyard soils, from the inferior growths? About the only difference universally made has been with regard to the grape varieties. Wine-makers have paid for Zinfandel and Riesling about twice the price that they gave for Mission. But for all that, the Mission—that most inferior of wine grapes—has retained the preponderance of numbers even to this

day, in most of the wine-making districts of this State. It makes the bulk of the wine; the foreign kinds are used to impart to the Mission some kind of character, and to give the mixture the name.

This, of course, is not news to many here present; and both here and in Sonoma, the best wines have been the result of such well-judged blends of musts, made prior to fermentation. But the principle should be more generally acted upon, and with a definite purpose in view, in the production of definite qualities and brands of wine, which shall be the best that can be made from given materials, and shall be able to show their well-known faces, year after year, in the market; claiming and receiving the benefit of established reputation, not in the name of Bordeaux, Hochheim, Oporto, or Malaga, but in their own.

That I consider the first and most important matter to be attended to by the wine-growers of this State; and in accordance with this view, I have arranged my plan of investigation of California grapes and soils, to be carried out by the aid of the act passed by the last Legislature.

In order to know how to blend, you must either experiment at random, and that is a costly and lengthy process of obtaining knowledge; or else, you must know the composition of each kind of grape, and of the wine it will make by itself, with its faults and merits. This will give you, at once a reliable indication of the proper blends for the production of wine of certain desired qualities, and for its treatment before and after fermentation.

This is what we are trying to do now, in the cellar and laboratory established at the University. This, the first season, we have unavoidably been late in getting to work, and our arrangements have not been as perfect as could have been wished, or as they will be the coming season—that is, provided the Legislature continues the necessary appropriation. We have found out what we must do hereafter, in order to crowd the largest possible amount of work into the vintage season, and what are the practical difficulties we will have to contend with. A detailed statement of results thus far obtained will be found in my annual report, now ready for the printer's hands. You will see that we have worked 100 tons of grapes, making about 15 gallons of wine of each, half white, and half red, or fermented on the skins. The several musts have been analyzed, and the wines will be, at the proper time.

Of course, this investigation, applied to even the most important only of the grape varieties grown in California, is a work of no little magnitude. Not only the several varieties, but the same variety grown in several different localities, should undergo this course of investigation. It is only in recent times that such investigations have been made on a somewhat comprehensive scale, even in Europe; and it is doubtful that the grape varieties will in our climate retain the same characteristics as in Europe. At least, we must determine whether or not they do so, and how far the difference goes.

But you will naturally ask, can you—can your chemicals and balances determine all these things? Well, no—not altogether. It happens unfortunately, that the highest qualities of wines, the bouquet, the "mouthliness," escapes as yet the chemists' exact appreciation. But we do know, in general, as matter of experience, upon what other and more easily determined substances the acquisition of these qualities by wines depend. The European vintners made their Chateau La-

fitte and Johannisberger long before chemistry was a science applied to practice. But upon the basis of their experience, we can go backward and see what is the nature of the materials and treatment that produce such results; and from a knowledge of these we can go on to judge how to produce similar results under different circumstances.

Now, I am not one of the purists who maintain that the juice of each kind of grape must be fermented and swallowed by itself, whether it brings tears to your eyes or not. The celebrated "Grueneberger" of Silesia would be greatly benefited by a dash of Mission. In fact, judicious blending is the height of the art of wine making; for it is certainly an art, and a difficult one, to produce the best result from given materials so infinitely varied, even as regards the same grape variety in different seasons. So far, the blending has been left chiefly in the hands of the wine merchants at San Francisco. It is no reflection upon those gentlemen to say, that they have not been altogether successful in their efforts to adapt the uncertain raw wines that came to their cellars, to the established tastes of the world's market. It stands greatly to their credit that on the whole, neutral spirits, logwood, glycerine and sulphuric acid have played but a small role in their manipulations, and that the character of California wines for purity, that is, for containing only the juice of the grape, has not suffered at their hands. It is true that thus far, the cheapness of the native wines has kept the temptation down to a small limit. Let us hope that the rise in the values of the product will not give rise to an increase of dubious practices, whether in the city, or in the grape-growing districts themselves.

But the blending of wines after fermentation is but an expedient, resorted to when the proper blend has not been made at the time when, of all, it should be done, viz: before fermentation. Mission wine will still be Mission, though you cover it over with a heavy dash of Zinfandel, Burger, or Burgundy wine. But when the blend has been made while both were yet must, the case is different. For the Zinfandel will find use for all its natural harshness and acidity, in modifying the contrary qualities of the Mission, during the act of fermentation; and the blend thus made will form a harmonious whole, quite different from, and much superior to, the blends made of the respective wines.

And just here allow me to suggest, that you must not ask the chemist to do all this without your help, in the way of information as to experience had, and as to the points that should be investigated first, as of chief practical importance. We do not work by magic, but simply by refined common sense, brought to bear on facts accurately observed. That constitutes the essence of science. It deals with facts; and for these, it must go to those who have the best opportunity to observe them. Do not suppose that we, or I for that matter, know all that *you know* about these matters as they stand in your valley. They are not on record anywhere, and I have not seen your valley and its vineyards and wineries until this year. Then how should I know? I say this because not uncommonly, a great many more questions are asked than I can answer with the facts in my possession.

One such is, how best to improve your soils. I wish I could tell you; but I have only seen them for a day or so, within the last few months, and up to this day, have no samples of them at my office, although I have asked for them repeatedly, and sent on directions for taking them to gentlemen in your valley. Then of course,

I have not analyzed them—perhaps could not have done so if I had had them. But now, when we get over the vintage work, we will be ready to begin on the soils, if you will but furnish the materials. As we cannot travel and be in the laboratory at the same time, that will be the quickest way to get at it. I have here, for your use, the printed directions for taking soil specimens, which I would specially ask you to adhere to as closely as you can. Work spent on samples improperly taken, is worse than useless.

This is but a part of a work I have been trying to carry on under difficulties, for several years past. We want an agricultural map of the whole State, to accompany a full description of its agricultural features; so that any one thinking of coming here, can get the information he wants from a disinterested source, and that our own farmers will know something, beforehand, of the kind of country they will find in any other part of the State.

I have been able to do something in that direction, during the past season, by the aid of the United States Census office; counting in California as one of the virtually, if not actually, cotton-producing States. I am sorry the vintners did not come forward in time, or the whole of the State might have been included in the investigation, instead of the southern and middle portion only. But if the appropriation for the viticultural industry is continued by the Legislature, at least the vine-growing districts will be so far investigated during the coming year, that a reasonably accurate map of the kind spoken of can be constructed. One of that kind for the State of Mississippi, just completed for the census, is here before you. It would have been a splendid advertisement for California to have had a similar map in the census report: but I cannot promise that it will be as complete as this. After awhile we will have special maps of this kind for each district in the State, if my plan is carried out.

There are, however, some things I can tell you about your soils, and about the soils of vineyards in general, and the means of keeping them in good condition as to productiveness.

First, as to the selection of soils for vineyards in general. It is habit with some persons to say that we must in all things follow Nature's indications. That is a truism, in so far as all our investigations are based on nothing, if not on Nature's facts and indications. But what such persons mean would be in this case, for example, is that we should plant vines by preference where Nature plants the wild vines, along creeks, etc. But the consistency of such persons would go rarely so far as to eat Nature's grapes in preference to Alexandria Muscat, which Nature has not planted anywhere; and Nature would be badly off if she happened to plant Seedless Sultanas, which, like the Leghorns that decline to sit, would be extinct in one generation.

What we want is to observe Nature's indications carefully, interpret them rightly, and then follow the road to improvement thus found.

Our largest wild vines grow on the banks of creeks, but the tallest and most vigorous are not those that bear the best grapes. Precisely the same holds true of cultivated vines. In soils causing the most vigorous growth the quality is inferior, though within certain limits the product may be larger. Beyond limit's limits, even the quantity of the fruit diminishes and the quality is very low. That is the case in

the tropics, where the little fruit that is borne is watery and insipid. The same tendency occurs on fresh, thrifty soils, and by the agency of manures that cause heavy growth of wood and foliage—ammoniacal compounds, &c.

Thus, when quality comes to be considered, the thirteen-ton soils are not likely to give the best results. They are good enough for eating grapes, and perhaps for raisins, but not for high quality of wines. Mr. Blowers tells me that even for raisins, the maximum crop he finds desirable is six tons per acre.

Now as to the influence exerted by the several kinds of soils on the quality of wines, let me give you the summary of experience in Europe, as formulated by Nessler, of Germany. They are substantially as follows:

1. Heavy soils, *other things being equal*, make wines of deeper color, high bouquet, heavy, and of good keeping qualities.

2. Sandy soils make lighter wines, with less bouquet, not keeping and improving so well, and less tinted.

3. Calcareous soils, make sweet wine, but with less bouquet.

4. In very hot seasons, heavy soils are better less droughty, than light ones, if well tilled and drained.

5. Dry, stony, alluvial soil, makes sweet strong wine, with good keeping qualities and less bouquet.

In interpreting these rules, you must not forget the introductory proviso, and that differences of climate modify them.

Again, they are given with regard to soils on which any sensible man will try to make wine at all. It is a pity that in the absence of a proper detailed investigation of soils designated, Nessler's rules are still somewhat vague. But they are good for comparative estimates. I will try to give you a little more in detail, some of the points to be considered in the adaptation of soils to growing grapes for wine-making.

The soils least adapted to the production of grapes of high quality are those designated as "cold." A cold soil is not necessarily either "heavy" or "light" in character; it may be either. The characteristic point is that they remain water-soaked until late in the season, or throughout the year; or that at least, their subsoil is of that character. The presence of the water, and especially its evaporation, prevents their being warmed up to the proper temperature by the sun's rays. Fruit crops that will grow at all in such soils, are of sappy habit, and produce a watery, unsavory fruit, lacking sweetness as well as aroma.

Underdrainage, deep culture, and in most cases, the use of lime, are effective in correcting the coldness of soils. These remedies must be applied the more thoroughly, the more clayey the soil to be treated. A "cold, gray, valley, adobe" is about the worst type of the class.

The reverse of the cold soils is warm ones. Let us consider what tends to make a soil warm.

First of all, water must not stagnate on it, or in the subsoil at a depth less than eight or ten feet, during the growing season. To this end, the soil should be *loose*, and pervious to the water, though not "leachy." Close clay or adobe soils are, therefore, not naturally warm soils; although they can be made so by judicious treatment.

Besides being loose a warm soil must be *deep;* for if a heavy, cold subsoil underlie it at a little depth, the heat absorbed from the suns rays will soon be taken by the latter. Worse than this, the roots of plants will remain near the surface only, and later in the season, they will be subjected to excessive heat, and drought. Moreover, a deep, loose, well-tilled soil will retain, at night, the warmth absorbed during the daytime; the conduction of heat being less rapid, the surface only will cool down below the point congenial to vegetable growth.

For the better absorption and rentention of warmth, soils of deep colors are particularly adapted; the more as these colors result from the presence of substances that themselves exert other favorable action. *Humus*—the black vegetable matter of soils—stand foremost among substances absorbing heat; while, at the same time, it is most effectual in rendering the soil easily tilled, loose and thrifty. Other things being equal, therefore, dark or black soils are warmer than light colored ones. Unfortunately, so far as grape culture for wine is concerned, black humus soils are rarely found out of the valleys.

The substance that stands next to humus in efficacy, as regards the physical effects on soils, is "ferric hydrate," hydrous ferric oxide, hydrated oxide of iron —iron rust, to speak plainly—in the fine state of division in which it colors soils yellow, brown, "mahogany, or red." It is second only to humus in imparting to soils the quality of absorbing and retaining heat and moisture—not *wet*—in and in condensing such important gases as carbonic acid and ammonia, from the atmosphere. In larger quantities, also, it serves to render soils loose and more easily tilled. Of this you can, doubtless, find examples in your own experience. Where red soils are cultivated, there are occasionally wet, ill-drained spots, whose soil is gray or white. These are always inferior to the red soil surrounding them, in productiveness, even though you may drain them. If you do not, they may in wet times be absolutely poisonous to vegetable growth. Stagnation of water in red soils is doubly injurious, for it converts the iron rust into a soluble compound that is deadly poison to roots, just like copperas. The iron is dissolved and washed out of the soil into the subsoil, where it forms "black gravel." You have seen that a hundred times. It is one reason why valley soils are rarely red; water will stagnate on them once in a while, and then the iron is leached out. Your mountain sides are red, and your valley soils have come from these slopes; yet the color has been lost by the process I have mentioned. The place of the lost iron, however, has been filled by an accumulation of vegetable matter.

In cultivating red soil, then, you must be particularly careful of good drainage. On the other hand, the fact that a soil is red, proves that it must naturally be well drained.

You now see that there is some reason why "red mountain" soil should yield better vintages (as to quality) than valley lands. They have that reputation all the world over. Then, if you make good wines now, what will you not be able to do when you ascend your mountain sides with your vineyards? The fact is, your best lands for quality of wines, lie idle thus far, with a few exceptions; such as the Schramsberg, and Howell Mountain, soon to be planted by Mr. Krug; and in the Sonoma Valley, notably the Koehler vineyards. All these are "volcanic" soils, reputed to be the best for high-flavored wines.

Next to these should come the granitie and slate soils of the foot-hills of the Sierra. About these, also, I know but little as yet; and the wines I have seen from that region, have not struck me as representing the best that can be done. Each region must find out what kinds of wines it is best fitted to produce. Yours is the soil and climate for high-flavored, dry wines; but I do not think you will be able to compete with Fresno and Los Angeles for such kinds as sherry and port, and Los Angeles will hardly produce any Chateau Lafitte or Johannisberger, do what she will.

There is another substance that is an important factor and help in warming soils; it is *lime*. The manifold and fundamentally important services that an abundant and cheap supply of lime can render to agriculture generally, and to fruit, and more especially grape culture in particular, is not yet remotely appreciated in this country. To speak again of following the indications of nature, the best wild grapes, and the greatest abundance of vines in the uplands, is always found in warm calcerous soils.

Lime does a great many useful things in the soil. It renders the heaviest adobe loose and friable, as I could show you by a simple lecture experiment, for which I am unfortunately not prepared. It favors the rapid decay of vegetable matter into true, black humus; preventing and if necessary curing all sourness, and enabling you to drive out weeds that, like the pestilent sorrel, depend on such conditions of soil. It mitigates in a great measure the coldness of soils, rendering them more pervious and more easily tilled. It tends to restrain the development of stem and leaf, in favor of fruiting—a phenomenon well known in the Old World, and abundantly noticeable in the cultivation of cotton in the Southern States. Where the cotton "runs to weed" a dressing of lime will often act like magic, reducing the size of the stalk to one-half and quadrupling the bolls it bears.

The price and quality of the lime now sold here are by far too high. There is about Martinez and Antioch an abundance of impure limestone, that could be cheaply burned for your use with the help of the screenings of the Mount Diablo mines. It should cost you about half of what you now have to pay, especially if, as is done elsewhere, the transportation companies reduce the freights on fertilizers to a nominal figure. They find that this puts money in their pockets in the end, by the increased production, of which they have the handling.

I cannot tell you whether or not your soils are specially in need of lime. So far as I can judge by their looks, you have no properly calcarious soils in this part of the valley. But the use of lime has another effect of great value especially to the vintner. Your grapes draw very heavily on the potash of the soil; that is the chief ingredient of the tartar in your casks. In the end, all wine-making countries have to use potash manures. But for the present, I doubt not that you can supply this need by the simple use of lime. It renders available to vegetation the insoluble potash in the soils, and of that I think yours contain a large supply.

Of other commercial fertilizers, I should recommend you to use bone-meal where the soil is naturally not strong. I find that the soils of Sonoma are not very rich in phosphates; I presume yours are similar. Excellent bone-meal is manufactured by two establishments in San Francisco; thus far, nearly all of it goes to New Zealand and Australia! That fact is rather a sorry comment upon the general condition of California agriculture. It is about time this export were stopped.

Except for the purpose of reviving vines that have suffered from the phylloxera, or other such set-backs, I do not think you should spend your money on any ammonia salts or ammoniated fertilizers, nor on guano. Even stable manure is hardly in place as yet, where quality is an object, though nothing can be better where weak vines require to be restored. Get as much of it as you can, for use in the proper place. But remember that all ammonia compounds make vigorous, sappy growth, and act against fruiting in general, and against quality in particular.

So much for manures, properly speaking. Now, a word about the maintenance of fertility without them. You know that all that comes from the vineyard has, to a certain extent, drawn upon the plant food in the soil, and this you must at some time restore by the purchase of manures, to the extent to which you fail to bring the refuse. The first and fundamental rule for the maintenance of fertility is always that you should return to the soil everything that grew on it, unless its market value is such as to make it more profitable to sell it, and make returns by purchase of manures, or otherwise.

Let me tell you what a failure to make such returns has cost the cotton States. Their marketable product, cotton, lint or wool, contains just one-eleventh of the plant food that the whole crop, including the seed, takes from the soil. So small a deficit would not be felt for a century, on a good soil, if ever; and experince as well as analysis show that when the cotton seed is regularly returned to the soil on which it grew, the latter not only does not deteriorate, but often actually improves. Thus, coton could be grown indefinitely without manure, on a soil of fair native fertility.

Now, what have they done? I will tell you. They have, for thirty years, tried to get rid of their cotton seed without puting it back on the land, even by hauling it for miles across the cotton fields to the bayous, to send their very essence of fertility down to the Gulf of Mexico. It has rotted around the gin-houses and created typoid fever and diphtheria; the latter have been located on the banks of flowing streams in order to obviate this trouble, and to be able more effectually to get rid of the nuisance. This waste is going on even now while I speak, in the Mississippi cotton region.

And the result? Well, you can see it in waste fields lying out all along the routes of railroads, which are now kept transporting to these depleted soils the bone and phosphate fertilizers of Carolina and Chicago. Need I say more?

Few crops present so extreme a case as cotton. Your wines carry off very much more, in proportion than does the cotton lint. But so far as it goes, your pomace represents the cotton seed, your prunings the cotton stalk. Even after distillation, the pomace, though not as rich as before (a good deal having remained in the wash), is still a fertilizer highly to be prized. So with the lees, the refuse grapes, &c. Timely attention to this point will save you many dollars in the purchase of manures, in the future.

More of this after more soils are analyzed. For the present, look well to the phylloxera, and when you have made sure that you will be able to repress it—which I think you soon will be—be sure to strive first and foremost for the establishment of the reputation of California wines both for quality and purity, rather than for quantity per acre. No grape sugar—none is needed here except for pomace wine, and you had better not make that till the reputation is established firmly. Now is your golden opportunity; and if you act wisely, energetically, and unitedly you are sure of success.

FIRST REPORT

OF THE

COMMITTEE ON THE PHYLLOXERA,

VINE PESTS,

AND THE

DISEASES OF THE VINE.

Report of the Committee on Phylloxera, Vine Pests and the Diseases of the Vine.

To the Board of State Viticultural Commissioners:

Gentlemen: Your Committee on "The Phylloxera, Vine Pests, and Diseases of the Vine," do respectfully report, as follows:

The work assigned to this Committee, involves so much original research as well as study of known authorities, and covers so large an extent of territory, viz.: the vineyards of a State nearly as large as the Republic of France, that we only pretend to have made a small beginning in the labors to be performed.

We have considered the ravages of the *Phylloxera-vastatrix* of the most pressing importance to investigate, and have up to this time devoted most of our attention in that direction.

THE PHYLLOXERA-VASTATRIX.

Concerning the entomological nature of this pest, we refer you to the interesting lecture delivered by Dr. Hermann Behr at Sonoma, on the occasion of the first viticultural meeting of the Sonoma District (see Appendix A); also, to the illustrations of the insect, obtained from Professor C. V. Riley, of Washington, D. C. (see Appendix B); also, to the reports of Professor E. W. Hilgard, of the University of California; also, to the valuable works of Professor C. V. Riley, of Washington, D. C.; and the French authorities which are many, important among which are, however, those of Professors Planchon and Foex, of the National School of Agriculture at Montpellier, Department of the Herault, Maximé Cornu, and the Reports of the Phylloxera Commission of the Academy of Sciences of France.

We shall not enter into any discussion of any disputed points relating to the origin of this pest, nor into the question whether it is cause, or effect of disease in the vine; it is sufficient for us at present to have determined by careful investigation that the pest in this State is identically the same as that which has caused so much damage in France and other countries; we find only an apparent difference in our favor in the slower progress, which it makes with us. Professor Hilgard has turned public attention to the fact, that the fertile-winged female form is rarely found in our affected vineyards, which may account for the slow progress referred to. It will be important to ascertain whether other conditions, such as virgin soils, more vigorous vines than in Europe, climatic influences, etc., retard the development and spread of the insect, or furnish the vines with resisting powers.

In the consideration of all these original questions, as well as of those pertaining to remedies, we shall greatly rely upon the assistance of scientific experts, skillful

inventors, and intelligent observers among the people, all of whom we cordially invite to co-operate with us in this work. We regret that this committee has not sufficient means to obtain accurate translations and copies of illustrations from all the most important foreign authorities, and that the appropriations for the use of the Board are insufficient for even the work of this committee alone. We respectfully recommend therefore, that adequate appropriations should be asked for, to enable this Board to direct experiments, and impart instruction with the especial object in view to extirpate the pest, or at least to prevent its progress and destructive agency; and, that this work may be more intelligently performed, we think that the purely scientific study of its nature and habits should be entrusted by the State to a State entomologist, appointed not only for this purpose, but also to investigate all insect diseases affecting any industry of our people.

PRESENT EXTENT OF THE RAVAGES OF THE PHYLLOXERA.

Unfortunately the work of investigating this subject systematically has been delayed so long by the State, that it is now difficult, perhaps impossible, to ascertain the true date of the first appearance of the disease, or the circumstances which might lead us to determine its origin. The search after the history of these ravages comes therefore next in importance to the investigation of their present extent, which we shall now refer to.

Believing that it was important for the people of the State to know, as nearly as possible, with accuracy, the full extent of the dangers to which viticulture is exposed, the exact locations of the infected vineyards, and where precautions must be taken to prevent further spread, your committee first attended the viticultural meeting, held at Sonoma on the 23rd day of July last, and there agreed with Professor Hilgard, of the State University, to unite with him in sending out an investigator for our joint benefit to examine the vineyards of the State, and to report, without fear or favor, wherever the phylloxera could be found. The gentleman selected for this work was Mr. F. W. Morse, a graduate of the University, now pursuing scientific studies, and qualifying himself by work in the laboratory as well as in the field for expert labors in viticulture. We preferred to begin in this way, inasmuch as the lack of experts and careful observers is a great disadvantage to the State, and our aim should be to educate such men from our own youth, giving them all the opportunities for study and accumulating experience that we can. The wisdom of our choice is apparent in the results of our first investigations.

Mr. Morse, under joint instructions from this committee and the State University, first visited the town of Sonoma and its vicinity, remaining long enough to become familiar with all the prominent indications by which the presence of the insect may be detected or suspected, examining roots of diseased vines by means of personal labor, aided with a simple microscope, and acquiring general knowledge concerning the progress of the disease. Then he visited all the most important vineyards in the following counties: Napa, Solano, Yolo, Placer, Eldorado, San Joaquin, Fresno, Los Angeles, Santa Clara and Alameda. Our means for defraying expenses having been more than exhausted, we could only complete this partial reconnaisance by instructing him to return to Sonoma county and trace there the extent of the affected vines.

The details of his observations, continuously made from August 6th to September 25th, we shall leave to be set forth in Professor Hilgard's report. We are only satisfied with them so far as they give us positive information of the presence of phylloxera in certain places, and a fair presumption for believing that others are not affected. Our work cannot be thoroughly satisfactory until we are enabled to keep an expert constantly employed until such time as we have mastered the subject.

Through Mr. Morse's opservations, we find that the phylloxera exists now in Sonoma, Napa, Solano, Yolo, Placer and El Dorado counties; south of those counties he did not discover any traces, although it should be said, that he did not have time to visit the foot-hills of the Sierra Nevada south of El Dorado, nor the coast counties lying between Santa Clara and Los Angeles. North of the counties affected, our researches have not yet been extended; we have, however, information from all the leading viticultural regions.

In Sonoma county we find the disease confined to the small valley of Sonoma; rumors reached us of its existence in other places, but upon examination it was not found. The public should not confound the Sonoma Valley with the county of which it is a small, though valuable part.

In Napa County, the phylloxera was found generally in the vineyards of both sides, from the lower part as far as Yountville. In the more important viticultural districts of St. Helena, from Yountville to Calistoga, only one infected vineyard has been found.

In Solano County several places were found affected.

In Yolo County, the cause of the small yield of the well-known Orleans Hills vineyard, was discovered to be due to phylloxera; one other small vineyard was found to have been affected.

In Placer County, what has been known as the Nickerson Vineyard was found affected.

In El Dorado County, two vineyards near Placerville were found diseased, and indications were noticed in another place to the west, where no opportunity to examine roots was obtained.

In making these observations, we are indebted to the cordial co-operation of viticulturists generally throughout the State. To their honor, it may be said, that with few, if any exceptions, do they attempt to conceal the truth. The only opposition to these investigations that we have heard of, has been caused in the Sonoma Valley, through the discontent of certain parties, who complain that the talk about phylloxera prevented one, or two sales of infected vineyards, the most prominent of the complainants being a capitalist, whose funds are largely dependent upon vineyard securities in the infected parts, and who strenuously insisted that the phylloxera danger was a mere bugaboo. We would not mention these unreasonable complaints, excepting that they have, by added misrepresentations, seriously impaired the opportunities of this Board for the public good, by alienating from us the hearty co-operation of some people, whose interests are best subserved by harmonious action, truth telling, and making known their necessities for the intelligent guidance of our State and national governments.

HOW SERIOUS THESE DANGERS ARE.

We should not conceal the fact that the presence of the phylloxera in this State seriously menaces the prosperity of an industry that is destined to be one of the chief resources of the people; but it does not appear to us so great an evil as many suppose. If nothing should be done to check or extirpate the insect, a supposition which we do not consider fair to entertain, the slow progress of the ravages, judging from past experience with us, gives us a large margin of time for vineyards in infected places to continue to be profitable, and leaves the planting of new vineyards in unaffected places safe fields for investments, the profits of which will amply cover all losses before destruction can take place. In this State we have vast areas of land suitable for the culture of the vine where it may be planted, and with reasonable hope of security quarantined against the introduction of disease, while infected places may be allowed to rest, or cultivated in other ways. Such conditions unhappily do not exist in France, Spain and other countries, where this pest is so much feared. Moreover, we have sections of country where the soil is of such a sandy nature, that little is to be feared from phylloxera, also places where submersion of vines may be practiced. And, still further, although we have vineyards already planted to protect, the vineyards to be planted are vastly more in acreage, and the planter may select phylloxera proof varieties of American vines to graft upon, or to cultivate for their fruit. In France this question is more formidable, because, 1st, the pest has gained such headway while scientists have been studying it, and wars have obstructed national action, that when the remedy is found, whole districts have been destroyed; 2d, because, generally the viticultural lands are worn out and useless for other culture; 3d, because the energies of the people cannot find virgin soils to operate upon in extending the areas of new vineyards. So, viewing this question in the worst light possible, it is not so alarming to our State as would at first appear; nevertheless, the losses that may be suffered, and the insecurity of capital invested, which now has been estimated at thirty million dollars, bring the subject matter forcibly before the public mind, and challenge grave consideration on the part of legislators.

The phylloxera was not known to exist in any of our vineyards until 1873, but circumstances preceding indicate that vines were affected by it as far back as 1860, and probably earlier; it was not detected in France until 1865. How long it had existed there then, no one knows. The current opinion among entomologists is, that it was introduced into France on cuttings of American vines, (not Californian) which were being propogated at the time the total destruction of French vines from oidum was feared. That was ten or twelve years prior to the actual discovery of phylloxera in the valley of the Rhone. The gall louse, affecting the leaves of vines in America, the roots of which are not attacked by phylloxera, is claimed to be the same as the latter, which is found on the roots of the cultivated European varieties. It is possible that the phylloxera was introduced into this State upon vines from States east of the Rocky Mountains, the Catawba, Isabella, etc.; but if we must show that it came to us on European roots and cuttings twenty, or twenty-five years ago, it is difficult to reconcile this hypothesis with the French theory of its first introduction into Europe from America, because vineyards have been found here, which appear to have suffered from the pest as early as 1860, the vines of which were imported directly from Germany; no other vineyards being within many

miles of the affected place here. This leads us to encourage scientists to still further study the origin of the phylloxera.

The history of the disease in the Sonoma valley is shrouded in mystery, and it is now impossible to obtain satisfactory proofs as to origin. It has probably been there at least twenty years, but the evidences of its development and progress are matters of conjecture and circumstancial only. We refer you to the report, prepared for this committee by Mr. H. Appleton, of Sonoma, one of the sufferers. (See Appendix C.)

As soon as our investigator, Mr. Morse, discovered the phylloxera in the Orleans Hills vineyard, in Yolo county, there seemed to be a possible chance to trace its origin, because that vineyard is situated in such an isolated place, distant from other vineyards, that contamination most likely was caused by introducing germs upon the cuttings or plants, rather than after they were growing in place, by the emigration of insects. We have taken pains to learn something of the early history of the planting, and refer you to the report of Mr. Knauth, who planted it. (See Appendix D.) Mr. Knauth recognizes now that a disease, which troubled him twenty years ago, must have been the phylloxera, which now afflicts the same place. He imported his cuttings direct from Nassau, Germany, in 1853, propagated them in Sacramento, and planted the vineyard in 1859-60. If then he introduced the phylloxera with his cuttings, it appears that he must have brought the germs from Germany in 1853, which was about the time the French believe it was imported into France from the United States. At that time it was unknown in France or Germany, and is still little troublesome on the Rhine.

We have evidence, however, that the disease has been in the Sonoma Valley and on the Orleans hills twenty years. Vines were dying in unfavorable soils twenty years ago in both places. The progress since then has been nothing alarming except to those whose vineyards are planted in shallow, poor, and clayey soils. The Buena Vista vines in Sonoma are dead or dying where the soil is shallow and overlying a bed rock of sedimentary lava deposits, but in the lower ground, where the soil is deeper and finer, fair crops are still taken. In the Orleans vineyard, the vines in the adobe (clay) soils at the base of the hills are dead, while those on the hills, where there is a more friable soil, with a hard, sedimentary substratum, the vines still live and yield what would be considered in France fair crops. Continued and fatal work has only been noticed of a serious character in shallow soils, especially when underlaid by a bed rock, or in stiff clays or adobes, which crack open, and are full of dry seams in summer.

In the southern part of the State, where alluvial soils are cultivated and irrigated generally, no phylloxera has yet been found. In Napa county shallow, hillside soils are affected, while no infection has yet been noticed in the deep gravelly loams of the St. Helena District, the only two places affected in that vicinity being hillside vineyards, one at Yountville and one near St. Helena. In the sandy soils west of Santa Rosa, in Sonoma county, the insect has not yet appeared.

From these observations we can only deduce general opinions; nothing is yet certain, for time has been lacking, and means as well, for conducting perfect examinations. We can, however, point out the fact that the phylloxera has apparently been in the Sonoma Valley and the Orleans hills about as long as it has been supposed to have been in France. During that time it has devastated one and a half

million acres in France, sweeping fatally through entire districts, while it has yet failed to destroy the vines of the little Sonoma Valley, or even entirely the vines of vineyards where it first appeared, and has killed the vines of the Orleans hills only in the adobe soils. We have therefore no reason to fear any speedy destruction of California vineyards, while we have good reason to believe that by energetic action, aided by proper legislation, we may rid the State of the pest, and we know that in certain soils and under certain circumstances the viticulturist has no reason to dread this enemy at all.

THE REMEDIES FOR THE PHYLLOXERA.

Concerning remedies for the phylloxera, there is little yet to be learned from experience in this State. We are practically dependent upon the results of experiments made in France in making our recommendations, although we hope much light to be thrown on the subject by the intelligent works that have been begun lately among us. The French reports of the Phylloxera Commission of the Academy of Sciences, of the National School at Montpellier, of the various departmental societies and commissions are so voluminous that we cannot at this time pretend to give a synopsis of the actual work that has been done. Stimulated by munificent offers of prizes, the scientists of Europe have greatly exhausted their resources in their efforts to find the best cure. A careful examination of the best authorities enables us, with confidence, to recommend:

FIRST.—Planting vines in sandy soil.

SECOND.—Submersion of vineyards, when practicable, to destroy or arrest the phylloxera.

THIRD.—Among the insecticides, the use of bi-sulphide of carbon accompanied by appropriate fertilizers, chief among which should be potash.

FOURTH.—Grafting upon certain varieties of native American vines, the roots of which experience so far shows to be proof against the pest.

What it known with certainty, accompanied by proof in practical viticulture, is to be collected under the foregoing heads.

Inasmuch as we have no trouble from phylloxera yet, where the vines are in sandy soil, or where they may be submerged, if necessary, our present work is mainly, therefore, to be directed in the lines of insecticides and grafting.

INSECTICIDES.

Concerning the use of the bi-sulphide of carbon, which has heretofore been too expensive for general application and extensive experiment, we are happy to announce that one of the first practical results of our efforts, in awakening inquiry, has been the establishment of a factory for the manufacture of the sulphide, at West Berkeley, and, in justice to the State University, we should not forget to mention that it is to another of its graduates that this honor of instituting an enterprise for the benefit of agriculture is due, Mr. John H. Wheeler, whose report to us is submitted herewith. (See Appendix E.) Mr. Wheeler will soon have his factory in working order, and proposes to sell the bi-sulphide of carbon in suitable packages (packages to be returned), at the rate of eight cents per pound, which is far more favorable to the viticulturist than could have been hoped from any other source

than that of the energy and public spirit of a Californian youth, educated in our own State, and ambitious for the welfare of the people from whose support the University which educated him, has drawn more than one such advantage for the State. Heretofore the price of the sulphide has been, in California, about thirty cents per pound.

Concerning the methods of applying this insecticide, we refer you to the instructions of the Paris, Lyons and Mediterranean Railroad Company, translated from the French, for this Committee, by Miss Anna Louise Wetmore (see appendix F); also to the translations of correspondence between M. Frémy and M. Thénard, made by Dr. John I. Bleasdale, Secretary of this Board (see appendix G); and for further information concerning the efforts that have been made in France to check the pest, to the abstracts of the reports *(Comptes Rendus)* of the Phylloxera Commission to the French Academy of Science, also made by Dr. Bleasdale. (See appendix H.)

Your Committee, while recommending the bi-sulphide of carbon, do not wish to be understood as endorsing it as the *only* effective insecticide for the destruction of phylloxera. So far as experience in France has proved it, it appears to be the only well known remedy, which practical work has demonstrated to be valuable. We have, however, great hopes that still more economical and less objectionable remedies will be discovered.

A great impetus to the inventive spirit of our local scientists and inventors was given by the important meeting held under the auspices of your member from the Sonoma District, at Sonoma, before referred to. We have already received notice of three or four remedies, each of which is claimed to be effective and new, each being the invention of a chemist, the preparation of which is kept secret, while the inventors are taking steps to secure their rights by patents. In only one case, however, has the inventor trusted us with the knowledge of his secret, viz.: the process of Prof. D. Mindeleff. Being satisfied, after examination of the French reports, that a material used by him had not been experimented with, and the principle of the application appearing to be good, we have caused some preliminary experiments to be made, with a view to determining whether actual application in the soil whould impair the insecticidal power of the remedy. This has been done with satisfactory results, although we have yet to determine whether it can be used effectively without injury to the vine, which seems probable.

Mr. G. Groezinger reports a remedy, the invention of a chemist, upon which private claims of patent right will be made. We know nothing of it, excepting that it is claimed to effect the destruction of the phylloxera in a few hours, without injuring the vine, and that it has been applied in Mr. Groezinger's vineyard.

On the Orleans Hills vineyard, last winter or spring, a strong solution of bluestone (sulphate of copper) was applied to the trunk and spurs of the vines and to the roots to the depth of about six inches. The outer bark had first been scraped clean. This was done before the phylloxera was known to be the cause of the weakness of the vineyard. The improved condition of the vines this year, and the fact that when the phylloxera was discovered there in August, it was only found below the depth to which the bluestone was applied, very naturally misled some into believing that blue stone could be recommended as a cure for phylloxera. Undoubtedly so far as it can be applied directly to the roots and wood of the vine, a

destruction of phylloxera and fungoid diseases will take place; but when applied to the soil to affect the insects upon the hidden roots it is ineffective, for it has been tried in France, because chiefly the sulphate of copper is neutralized by lime in the soil. Scraping the vines, burning the prunings and dead leaves and washing with bluestone, would undoubtedly greatly assist not only in retarding the spread of phylloxera by killing germs hidden in the bark, but also in exterminating germs of the several fungi, which are scarcely less to be dreaded than the phylloxera. It might also retard the spread of the Leaf Hopper.

In order that experiments may be carefully made and fairly reported upon, this Board should have power and means to establish local experimental stations in affected districts. The want of such aids has been seriously felt this year. Until we can obtain the means for such work, we earnestly recommend that the viticulturists establish stations themselves and appoint skilled experts to attend to them and report in detail upon all circumstances of their experiments.

For a short time we engaged Mr. H. Appleton, at Sonoma, to make daily observations with the aid of traps (mucilaginous coated cloth, etc.) for the purpose of detecting whether the winged phylloxera could be found migrating. Although this was patiently done, none could be found. Perhaps the work was begun too late in the season (August), and to be more certain further work should be done next year. The only winged females thus far discovered and reliably attested within our knowledge, have been developed from infected roots after they have been placed under glass. Experiments similar to those of Mr. Appleton's were conducted also by Colonel George F. Hooper, at Sonoma, but with like results. There appears to be reason, therefore, to believe with Prof. Hilgard that the slow progress of the pest in this State is due to the absence or rarity of the winged migrating female, or the infertility of those that do exist.

We have one further important observation to make concerning dependence upon insecticides. No permanent good can be accomplished in any affected district unless *all* the vineyards, which may possibly infect each other, are thoroughly disinfected. Therefore, until State, or national aid can be obtained, it is important that local district co-operation among proprietors of healthy as well as diseased vineyards, should be resorted to, the common enemy being fought by united action on the part of all interested, either in self-defense, or prevention of the threatened invasions. Even without laws for that purpose, we doubt not but that the good sense and common good-will of neighboring vine growers will enable them to enter into compacts to enforce sanitary regulations and quarantine rules. All cuttings passing from one vineyard to another should be disinfected, not only to prevent the possible transfer of phylloxera, but also to keep out germs of fungus. Rooted vines, when needed, should be grown from disinfected cuttings and avoided, as much as possible, when brought from other places. Particular attention also should be given to disinfecting cuttings or roots imported from the East, notwithstanding they may be phylloxera proof. Though they may be proof themselves, they may harbor the insect and spread contagion to other vines. There is an imperative necessity for a law preventing the importation of any vines which do not pass inspection and undergo disinfection by a State officer appointed for that purpose. The State has many millions of dollars of taxable property to protect, and vastly more in prospect; her

revenues are at stake in the question, just as her vital strength is, when threatened by contagious diseases affecting human life.

PHYLLOXERA PROOF VINES.

Although all the cultivated varieties of vines of European or Asiatic origin (*vitis vinifera*) do not with equal facility yield to the phylloxera, yet none have yet been found which successfully resist its attacks. Whether this is due, as some think, to the exhaustion of the vitality of the vines by long culture without recourse to the seed as a means of propagation, or whether the *vitis vinifera* varieties are constitutionally and from their origin different from the American resisting stocks, we shall not attempt to discuss, preferring to leave all debatable ground for further study by scientists.

North America is rich in distinct species of the wild vine, while in Europe and Asia only one (*vitis vinifera*) is known.

The species of American wild grape vines are as follows :

1. *Vitis Rupestris*, (Schule), the bush grape, or sand grape.
2. *Vitis Cordifolia*, (Michaux), winter or frost grape.
3. *Vitis Riparia*, (Michaux), riverside grape.
4. *Vitis Arizonica*, (Engelmann), Arizona grape.
5. *Vitis Californica*, (Bentham), California grape.
6. *Vitis Æstivalis*, (Michaux), summer grape.
7. *Vitis Candicans*, (Engelmann), Mustang grape of Texas.
8. *Vitis Labrusca*, (Linnæus), northern fox grape.
9. *Vitis Vulpina*, (Linnæus) southern fox grape or Muscadine.

From the third, sixth, eighth and ninth, by culture, seedlings and hybrids, have been produced the several hundred varieties of American grape vines. Those who desire to know how the cultivated varieties are classified under these heads, should consult the work of Dr. G. Engelmann, prepared for the "Bushberg Catalogue," of Messrs. Bush, Son & Meissner, St. Louis, Mo. Among these, experience has shown that the *Labruscas* do not resist the phylloxera much better than the *Viniferas*. Experiments with the *Arizonica* and *Californica* have been begun only during the last year. All the others appear to be resisting vines; but the weight of evidence appears to be in favor of the wild *riparia* and *rupestris* for grafting stock. One of the members of this committee had an opportunity in 1878 to inspect the experimental vineyards of the National School at Montpellier in France, and then reported that only the pure wild stocks, with the exception of the *Jacquez*, were perfect in their resistance when subjected to severe tests; the cultivated and improved varieties varying more or less in their degree of resistance. Later, on the 6th of April, 1880, Professor Foex, of the Montpellier School, wrote to Mr. Wetmore as follows: "The types which we prefer are, for the sake of their fruits, the *Jacquez* (or *Ohio*, cigar-box, etc.), *Herbemont* (or Warren), and the *Black July* (or Devereux Lenoir). For grafting stock we prefer the wild *vitis Riparia*, which is sent to us from Missouri, Iowa and Kansas, and the *vitis Rupestris*, from Texas."

If, therefore, it is a question of propagating American vines for the sake of their fruit, we must be content with a less degree of resistance; but if we desire only grafting stocks, we should cultivate for that purpose, the pure wild vines, and we are recommended to use the *riparia* and *rupestris* by the best known authority on the subject. As experiments are further advanced, others may be equally recommended, and possibly the *vitis Californica* and *vitis Arizonica.*

Several large orders for American cuttings have been made for this winter, notably one for 120,000 cuttings by Mr. J. W. Simonton, to be planted in his vineyard, near the dividing line, between Napa and Sonoma counties.

We refer you especially to the translation of a synopsis of lessons on grafting American vines, given at the National School at Montpellier, by Prof. Foex. (See Appendix I.)

Concerning the cause of the resistance of American vines, there are two prominent theories advanced, each well supported by evidence. Prof. Foex demonstrates that the bark of the roots is denser and the woody fibre tougher with the American vines, than with the European, and attributes resistance to this cause, the insect being unable to cause mortal lesions. Another theory is based on the presence of a greater quantity of resinous matters in the American roots. Possibly resistance is due to both causes combined.

OTHER DISEASES OF THE VINE.

A new fungoid disease.—Your Committee have found that a grape blight has done considerable damage throughout the State, and seems to be increasing year by year in its destructiveness. It may be readily recognized by the scorched appearance of the foliage and young growth of vine, later small black specks appear on the grape, and when badly affected the clusters dry up entirely. It is thought, by competent authority, to be a fungus, of which spheria is the head and not oidium. As a remedy, we recommend the liberal use of powdered sulphur, to be applied as a preventive, just before the bloom forms, or when the new growth of vine is about six inches in length, to be again applied whenever there is the least appearance of the disease.

SIXTH.—The thripps-fly, or leaf-hopper, has done considerable damage in certain localities, and created some alarm. It harbors through the winter on the ground under the dry foliage of the vine, and it may be easily exterminated by raking the leaves together and plowing them completely under ground during the winter. The cut-worm, or budder, may be destroyed by turning pigs into the vineyard during the winter, or by stiring the soil very early in the season.

Other matters relevant to diseases of the vine will be discussed in the general reports of the Commission.

Respectfully submitted,

I. DETURK,
Chairman of Committee on the Phylloxera, Vine Pests, and Diseases of the Vine.

I. DETURK,
CHAS. KRUG,
GEORGE WEST,
R. B. BLOWERS,
CHAS. A. WETMORE.
} *Committee.*

APPENDIX A.

THE PHYLLOXERA VASTATRIX.

ADDRESS OF DR. HERMAN BEHR BEFORE THE SONOMA DISTRICT VITICULTURAL MEETING, AT SONOMA, JULY 23RD, 1880.

GENTLEMEN: When we have to defend ourselves against constant and repeated attacks of an enemy, our first step must be, in order to render our defense successful, to study the character and habits of the enemy and his hostile as well as friendly relations to others; for the friend of an enemy is an enemy, and his enemy is an ally.

Such is the case of the phylloxera; and before we consider our chances of warfare, and begin to attack, we ought to study the development of the evil and the various disguises under which it perpetrates its insidious devastation.

DEVELOPMENT OF THE PEST.

In all countries that have a real winter the phylloxera hybernates in the form of an egg. The more the winter approaches in its character a mere rainy season, the more the phylloxera develops a tendency to stay over the winter as a perfect insect, in a more or less dormant state. This last form of hybernation seems to be the rule in California; but the circumstance that the egg has not yet been found, is no proof that it should not exist.

The statements of Planchon, Lichtenstein, and Balbiani, all careful observers, agree perfectly in the description of the insect that comes out of the hybernating egg. This insect tries with its proboscis different spots on the leaves of the grapevine, and after having selected a locality, fastens itself there, producing by the irritation of this process a swelling of the leaf that grows out into a gall, not unlike those caused by the sting of the gallwasp. Inclosed in this gall, the phylloxera, without having had any sexual intercourse, lays eggs. Planchon has counted them up to nearly 800; and after having laid the last egg, the phylloxera dies and dries up, surrounded by the eggs that soon give birth to a breed of phylloxera. These insects, after having escaped through a fissure on the top of the gall, go through the same process of multiplication by eggs in time of three weeks, only their offspring is considerably less numerous than that of the first generation, developed out of the hybernating egg. Mr. Fatio has observed the phylloxera, after having tried several leaves, to descend to the root of the grapevine and inclose itself there in a nodosity

analogous to the gall of the leaf. At any rate it is certain, although it has not been exactly observed, that the phylloxera, sucking the sap of the roots without being inclosed in nodosities, are the descendants of the gall, as well as the nodosity-building variety.

Toward the end of the year the phylloxera appears under a new garb. It looks quite a different being, and has adopted the form of a diminutive four-winged fly. This tiny insect has but little command over its flight. It is the toy of any current of air. Thousands of them perish in spider-webs and pools of water, and very few are carried by a lucky wind to a spot favorable for laying a foundation for new generations. This the winged phylloxera does by laying eggs, of which she carries only a few (2–5), but of two kinds; small ones, out of which come males, and larger ones, out of which come females, both wingless. The female of this generation harbors only a single egg, and this is, in the insect kingdom, a very exceptional circumstance. This is the hybernating egg, out of which comes the founder of the many generations which follow, and which are non-sexual themselves. As far as this goes the habits of the insect are well observed, and everything is clear. But as to time and circumstances, when the phylloxera leave the gall-building and move about on the roots without inclosing themselves and their offspring, nothing is known. May be the nodosities on the roots are the product of generations that link the gall-builders to the phylloxera of the root; may be that galls, as well as nodosities, are only the product of adaptation. There is one thing certain, that there exist districts, infected by the phylloxera, where galls have not yet been observed. Another mystery is connected with the appearance of the winged generation and its offspring of wingless males and females.

It has been observed, and not only in the phylloxera, but also in the insects of analagous organization, that an indefinite number of non-sexual generations can follow through years without once producing a generation of males and females. Another queer circumstance is the great irregularity in the appearance of said winged generation and its sexual offspring. The duration of this state is short enough. A few days are sufficient to make them disappear without leaving any trace but the fertilized egg. The phylloxera can propagate through an indefinite number of generations without once appearing in the winged state. This shows that the winged generation is not necessary for the existence of the species. What is then the object, the function of that form? We may, perhaps, express the circumstance in the following way. When we recollect that it is chiefly in climates of a severer winter where the winged phylloxera has been observed, and there always late in the season, and when we further consider that the fertilized egg, which possesses a much slower development than the non-sexual, which develops shortly after its being laid, so all these circumstances seem to point to the fact that this fertilized egg, by the very slowness of its development, is better calculated to resist the inclemencies of the winter than the ordinary egg with its quick development, or the phylloxera herself in her torpid dormant state of hybernation. There is in this circumstance an analogy to certain water plants producing two different kinds of spores: moving spores which have to sprout after a short time or perish, and resting spores, that can remain latent for a long space of time and develop as soon as circumstances become favorable.

Now these moving spores swarm and sprout till all the water in which they took their first start is filled with their gelatinous masses: but when at the end of a season

or when by any other circumstance the water begins to dry up, the resting spores are formed, mix with the slime of the pool, when this slime is pulverized by dryness and heat, are carried with it to places where sufficient moisture favors their development, or remain latent at the bottom of the pool till rain or inundation fill it again. Now there is perhaps some analogy between the circumstances that produce in the alga, the resting spore, and in the phylloxera the fecundated egg of slow development. Either of them waits for a time or a place more favorable for its development Under ordinary circumstances, the resting spore of the alga develops with the first rain, the fecundated egg of the phylloxera with the sunshine of spring: exceptionally, when the supply of water becomes scarce, the resting spore trusts itself to the wings of the wind; if the sap of the grape-vine of one locality begins to fail, the phylloxera is carried by its winged mothers to new localities. In this way, perhaps, we may account for the irregularities in the time of appearance in regard to the winged phylloxera of milder climates.

WONDERFUL POSSIBLE INCREASE OF THE PEST.

Now let us calculate only eight generations through the season, each member of a generation producing only twenty eggs, which is a very low average figure; as the individuals bred from the hybernating egg alone produces, according to the statement of Planchon, up to 800, and we come to the astonishing figure of 256,000,000,000. Happily, there are circumstances that prevent that figure being reached.

THE ENEMIES OF PHYLLOXERA—NATURE'S REMEDY.

Nature always tries, and tries successfully, to restore a balance of power in her productions. The phylloxera itself, or at least its devastations, are a consequence of the balance in nature being disturbed by the culture of a single plant in certain localities to the exclusion of others. We will now see what plan nature adopts for destroying the phylloxera. We have seen how the exclusive culture of the grape-vine has attracted and multiplied the parasite that feeds upon it. In the same measure now multiply the beings that prey upon the phylloxera and they also will disappear, or at least diminish, when the phylloxera has been reduced to a number that does not any more disturb the balance in nature. Not all the enemies of this parasite are known. I am to enumerate here only those whose predilection for phylloxera blood is well established and sufficiently effective to come under our consideration. The phylloxera, owing to her subterranean habits, is not very accessible to birds. The influence of birds on insect-life is generally overrated. Amongst the insects that know how to find the phylloxera are some beetles of the tribes called Carabides and Staphylinides that destroy in all their stages of development a great number of phylloxera. Staphylinides may occasionally be seen on grapes. They do not feed on them, but are apt to impart to the grape a disagreeable smell. But we had better allow them that little extravagance, as during their long existence in the larva state they live chiefly on animal food—on fellows that are smaller than themselves.

There are several beetles related to the Spanish fly that feed in their larva state on and under ground, on eggs and small larvæ of aphidians, as well as grasshoppers. Certain wasps, that keep their young ones in subterranean galleries, feed them also

on phylloxera and its relations. You probably have observed on the stalks of rose-buds infected by leaf-lice (aphis), a little green maggot, shaped like a leach, and moving about very much like such. This is the larva of a fly (syrphus), somewhat smaller than our house-fly. If you observe what he is doing there, you will find that it is not for the sake of company that he frequents that crowd of leaf-lice. A similar maggot, only smaller, visits stem and root of the grapevine, where it devours considerable quantities of phylloxera. Then there is a tribe of four-winged flies, somewhat of the structure of the dragon fly, but considerably smaller, and the wings neither elevated (agrion) nor flattened out like those of the real dragon flies (libellula), but folded round the body, like those of a moth. This insect, called hemerobius, destroys in its winged state, aphidians, and perhaps also some gall-building phylloxera; in its wingless larva state it preys on aphidians of all kinds, following them from leaves to twigs, and from twigs to stems, from stems to roots. It has been found in company with the phylloxera, of course not as their friend. The class of the spiders and mites *(Arachnidæ)* are all carnivorous, and many species prey on the plentiful and defenseless phylloxera.

A French lady, Mad. de Bompar, mentions especially a little mite called *trombidium* as an active destroyer. I am not quite satisfied in regard to the predilection of this little being for the phylloxera; at least it lives not exclusively on aphidians. Mrs. Wetmore, who raises in a box our native grapevine *(Vitis Californica)* for the sake of experiment, found a great many of these minute mites on the roots, where we could not trace a single phylloxera. But the web-making spiders do really good work; especially the smaller species of ground spiders, that fasten their nets between twigs, are perhaps even of greater use, as they destroy the winged generation, inaccessible to all the destroyers enumerated before. How many of the winged aphidians die without being able to propagate, we can form an idea by examining those spider-webs that are left by their owner, so that the tiny customers that caught themselves in their meshes are no more removed. There may be many more enemies of the phylloxera besides those enumerated, for many things that happen every moment among the little things under ground escape our notice. It is certain there are more victims of that microscopic warfare than we generally imagine. Entomologists are well acquainted with the fact that insects that are excessively common through a certain time, disappear sometimes suddenly as if swept away by an epidemic. At any rate a diminution of the phylloxera pest is to be expected before they have ruined our vines.

Among the insect pests mentioned by different authors, there is perhaps none that bears so much analogy to our case as the invasion of the apple trees of Northwestern Europe by a certain relation of our phylloxera, the Myzoxylus. I once found among old papers an account of the devastations of this insect, the despair it caused in the cider-making districts, and very many remedies recommended. The insect still exists, but in very moderate proportion. Which of the many remedies recommended has reduced the Myzoxylus to a more reasonable style of living I could not find. I think none of them. Medical men know very well the more remedies they possess against a disease the more incurable it is. I do not assume to criticise the different methods recommended for the destruction of the phylloxera, but their very number appears to me a proof that none of them has answered.

NECESSITY FOR THE ADOPTION OF NATURE'S RULES.

Let us follow the way nature has pointed out to us. First let us isolate the infected patches as much as possible. The subterranean phylloxera cannot spread when we do not prepare its way by plowing and weeding the vicinity.

Then let us favor as much as possible those insects, which we know feed on aphidians, especially the spiders, we must protect their webs. It is true they are not ornamental, but they are the most effective means to prevent the winged phylloxera from colonizing other parts of the vineyard.

I have to mention yet the ant as a friend and patron of leaf lice, which he keeps as cattle and colonizes them in his subterranean galleries. There is not a fact of this kind known in regard to phylloxera, but at any rate, the ant is a suspicious neighbor, and his hills have to be destroyed.

Till science has given us a destroying medium of quicker action, let us imitate and assist the slow, but effective process begun by Nature, and whatever plan we adopt, let us act in concert.

APPENDIX B.

THE PHYLLOXERA VASTATRIX.

ILLUSTRATIONS OBTAINED FROM PROF. C. V. RILEY; TEXT COMPILED FROM PROF. RILEY'S REPORTS TO THE STATE OF MISSOURI AND COPIED FROM THE "BUSHBERG CATALOGUE."

Among the insects injurious to the grape-vine, none have ever attracted as much attention as the phylloxera, which, in its essential characteristics, was unknown when the first edition of this little work on American grape-vines was written. The gall-inhabiting type of this insect, it is true, was noticed by our grape-growers, many years ago (especially on the Clinton), but they knew nothing of its root-inhabiting type. Even Fuller—who informs us that in Mr. Grant's celebrated grape nurseries (as far back as 1858), the men were in the habit of combing out, with their fingers, the roots of young vines to be sent off, in order to get rid of the knots—never mentions anything of this, nor of any root-infesting insect, in his excellent Treatise on the Cultivation of the Native Grape, though sixteen pages are devoted to its insects. In the spring of 1869, M. J. Lichtenstein, of Montpellier, first hazarded the opinion that the phylloxera, which was attracting so much attention in Europe was identical with the American leaf-gall louse (first described by Dr. Asa Fitch, State Entomologist of New York, by the name of *Pemphigus vitifoliæ*); and in 1870, Prof. C. V. Riley succeeded in establishing the identity of their gall insect with ours, and also the identity of the gall and root-inhabiting types. The correctness of his views is confirmed by the subsequent researches of Prof. Planchon, Dr. Signoret, Balbiani, Cornu, and other scientists in France; lately, also of Prof. Rœssler, in Klosterneuburg in Austria. *

After visiting France in 1871, and then extending his observations here, some of which were made in our Bushberg vineyards, Prof. Riley first gave us every reason to believe "that the failure of the European vine (*V. Vinifera*) when planted here, the partial failure of many hybrids with the European *Vinifera*, and the deterioration of many of the more tender-rooted native varieties, are mainly owing to the injurious work of this insidious little root-louse; also, that some of our native varieties enjoy relative immunity from the insects' attacks"—M. Laliman, of Bordeaux, having pre-

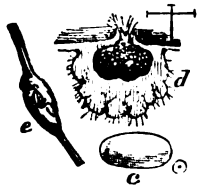
* While this is going to press we learn from Dr. A. Blankenhorn, Carlsruhe, Germany, that the phylloxera has just been found in three different places (Annaberg, Carlsruhe and Worms), always on the roots of American vines, which, however, do not show the slightest symptom of disease.

viously noticed the remarkable resistance of certain American vines in the midst of European vines dying from the effects of phylloxera. The importance of these discoveries to grape culture cannot be too highly appreciated. The French Minister of Agriculture commissioned Professor Planchon, of Montpellier, to visit this country to study the insect here—the harm it does to our vines, or the power of resistance which these possess. * His investigations not only corroborated Prof. Riley's conclusions regarding the phylloxera, but gave him, and through him to the people of Europe, a knowledge of the quality of our native grapes and wines, which will be very apt to dispel much of the prejudice against them that has so universally prevailed heretofore.

To discuss this subject as it deserves; to give a history of the grape phylloxera; the progress and extent of its ravages; the experiments made to prevent these; to review the influence which it had, and probably will have on American grape-culture —would far exceed the scope of this brief manual. The literature of this subject will already fill a respectable library. We can here merely mention a few facts, and give some figures, which may enable the grape-grower to recognize and to observe this minute, yet so important insect; and we refer those who desire full and reliable information to Prof. Riley's Entomological Reports, especially the Sixth, for 1874, from which we cull largely. It will be understood that all the figures are very highly magnified, and that the natural sizes are indicated by dots within circles, or by lines.

The following figure of a grape leaf, shows the galls or excrescences produced by the gall-inhabiting type of the insect. On carefully opening one of the galls, we find the mother louse diligently at work surrounding herself with pale-yellow eggs, scarcely (.01) the one hundredth part of an inch long, and not quite half as thick. She is about .04 inch long, of a dull orange color, and looks not unlike an immature seed of the common purslane. The eggs begin to hatch, when six or eight days old, into active little beings, which differ from their mother in their brighter yellow color, more perfect legs, etc. Issuing from the mouth of the gall, these young lice scatter over the vine, most of them finding their way to the tender terminal leaves, and commence pumping up and appropriating the sap, forming galls and depositing eggs as their immediate parent had done before. This process continues during the summer, until the fifth or sixth generation. Every egg brings forth a fertile female which soon becomes wonderfully prolific.

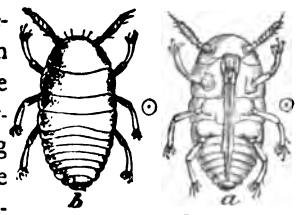
[Under side of Leaf covered with Galls.]



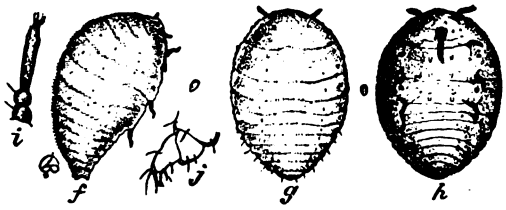
[Type Gallicola; *c*, egg; *d*, section of gall; *e*, swelling of tendril.]

* The full report of Prof. Planchon has just been published in the form of a most interesting little volume—"Les Vignes Americaines, leur résistance au Phylloxera et leur avenir en Europe." Paris, 1875.

By the end of September the galls are mostly deserted and those which are left are usually infected with mildew, and eventually turn brown and decay. The young lice attach themselves to the roots, and thus hybernate. It is an important fact that the gall-inhabiting insect occurs only as an agamic and apterous female form. It is but a transient summer state, not at all essential to the perpetuation of the species, and does, compared with the other, or root-inhabiting type, but trifling damage. It flourishes only on the *Riparia*, more especially on the Clinton and Taylor; a few of its galls have been noticed on some other varieties, and abortive attempts are often made to found them on others. And in some seasons it is even difficult to find a few galls on the very vines on which they were very abundant the year before.

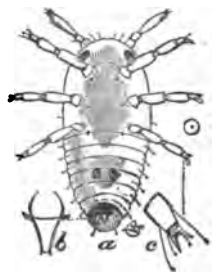


[Newly hatched Larva; *a*, ventral; *b*, dorsal view.]



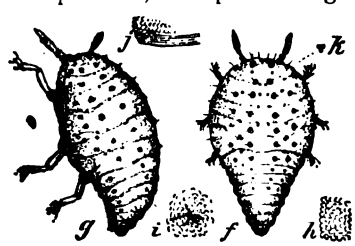
[Mother Gall-Louse; ventral and dorsal views.]

The root-inhabiting type of the Grape Phylloxera hybernates mostly as a young larva, attached to the roots, and so deepened in color as generally to be of a dull brassy brown, and therefore with difficulty perceived, as the roots are often of the same color. With the renewal of vine growth in the spring this larva moults, rapidly increases in size, and soon commences laying eggs. These eggs in due time give birth to young, which soon become virginal, egg-laying mothers like the first, and like them, always remain wingless. Five or six generations of these egg-bearing mothers follow each other, when, about the middle of July, in the latitude of St. Louis, some of the individuals begin to acquire wings and continue to issue from the ground until vine-growth ceases in the fall. Having issued from the ground while in the pupa state, they rise in the air and spread to new vineyards, where they deliver themselves of their issue in the form of eggs, and then perish. In the course of a fortnight, these eggs, which are probably deposited in the crevices on the surface of the ground, near the base of the vine, produce the sexual individuals, which are born for no other purpose than the reproduction of their kind, and are without means of flight or of taking food. They are quite active and couple readily.



[Male Phylloxera; Ventral View.

Every piece of root having rootlets, taken from an infected vine during August or September, will present a goodly proportion of pupæ, and a glass jar filled with such roots and tightly closed, will furnish daily, for some time, a dozen or more winged females, which gather on the side of the jar toward the light. We may gather some idea from this fact of the immense number that disperse through the air to new fields, from a single acre of infected vines in the course of the late summer and fall months. We have, therefore, the spectacle of an underground insect possessing the power of continued



[Type Radicicola: showing the tubercles by which it is distinguished from *Gallicola*.]

existence, even when confined to its subterranean retreats. It spreads in the wingless state from vine to vine and from vineyard to vineyard, when these are adjacent, either through passages in the ground itself, or over the surface; at the same time it is able in the winged condition, to migrate to much more distant points.

If to the above account we add that occasionally individuals, under conditions, abandon their normal underground habit, and form galls upon the leaves of certain varieties of grape-vines, we have in a general way, the natural history of the species.

The annexed figure shows the abnormal swelling of the rootlets, which follows the puncture of the root-louse; they eventually rot and the lice forsake them and betake themselves to fresh ones. As these decompose, the lice congregate on the larger parts beyond, until at last the root system literally wastes away.

During the first year of attack there are scarcely any outward manifestations of disease; only the second and third year—when the fibrous roots have vanished, and the lice not only prevent the formation of new ones, but settle on the larger roots, which also eventually become disorganized and rot—do the outward symptoms of the disease become manifest, in a sickly, yellowish appearance of the leaf, and a reduced growth of cane; and the vine dies. When the vine is about dying, it is generally impossible to discover the the cause of the death, the lice having previously left for fresh pasturage.

[TYPE RADICICOLA:—*a*, shows a healthy root; *b*, one on which the lice are working, representing the knots and swellings caused by their punctures; *c*, a root that has been deserted by them, and where the rootlets have commenced to decay; *d*, *d*, *d*, shows how the lice are found on the larger roots; *e*, female pupa, dorsal view; *f*, winged female, dorsal view.]

As is frequently the case with injurious insects, the Phylloxera shows a preference for and thrives best on certain species, and even discriminates between varieties, or what amounts to the same thing, practically, some species, or varieties, resist its attacks and enjoy a relative immunity from its injuries. A knowledge of the relative susceptibility of different varieties to the attacks and injuries of the insect, is therefore of paramount importance. Information on this subject, based on the researches of Prof. Riley, in addition to careful observation and experiments, made during the last four years by ourselves and our many correspondents in France and in this country, are contained in this catalogue, both in the "Description of Varieties" and in the notes to Dr. Engelmann's "Classification of Species." (Pages 4—12.)

The reasons why certain vines thus enjoy exemption while others so readily succumb, cannot be fully ascertained, but in a broad way it may be stated that there

is a relation between the susceptibility of the vine and the character of its *roots*—the slow-growing, more tender-wooded and consequently tender-rooted varieties succumbing the most readily.

We see in the general resistibility of our purely native American vines against the Phylloxera, a remarkable verification of that law which Darwin has so ably established and aphoristically expressed, as "THE SURVIVAL OF THE FITTEST."

Professor Riley, in explaining "Why the insect is more injurious in Europe than here," says: "There exists a certain harmony between the indigenous fauna and flora of a country; and our native vines are such as, from their inherent peculiarities, have best withstood the attacks of the insect. The European vine, on the contrary, succumbs more readily, not only because of its more tender and delicate nature, but because it has not been accustomed to the disease—there being, doubtless, a parallel between this case and the well-known fact that diseases and parasites which are comparatively harmless among peoples long accustomed to them, become virulent and often fatal when first introduced among hitherto uncontaminated peoples. Then the particular natural enemies of the insect which belong to its own class, and which in this country help to keep it within due bounds, are lacking in Europe; and it will require some time before the closely allied European predaceous species will prey upon and check it there to the same extent. The phylloxera, will, also, all other things being equal, have an advantage in those countries where the mildness and shortness of the winter allow an increase in the annual number of its generations. Finally, the differences in soil and in modes of culture have no insignificant bearing on the question in hand. Though phylloxera, in both types, is found on our wild vines, it is very doubtful if such wild vines in a state of nature are ever killed by it. With their far-reaching arms embracing shrub and tree, their climbing habit unchecked by the pruner's knife, these vines have a corresponding length and depth of root, which render them less susceptible to injury from an under-ground enemy. Our own method of growing them on trellis approaches more nearly these natural conditions than that employed in the ravaged French districts, where the vines are grown in greater proximity and allowed to trail upon the ground, or are supported to a single stake."

Again, after speaking of the large numbers of winged females rising from the ground during late summer and fall, he adds the following cogent reason in a recent number of the *New York Tribune:* "The winged female Phylloxera is wafted about, and will lay her eggs, or, in other words, deliver herself of her progeny, wherever she happens to settle. If this be upon the grape vine, well and good—the young live and propagate, if upon other plants they perish. We thus have the spectacle of a species annually wasting itself to a greater or less extent, just as in the vegetable kingdom most species produce a superabundance of seed, the larger portion of which is destined to perish. Thus in the thickly planted vine districts of France, few winged insects would fail to settle where their isssue could survive, while in America, an immense number annually perish in the large tracts of other vegetation intervening between our vineyards."

APPENDIX C.

HISTORY OF THE DISCOVERY OF THE PHYLLOXERA VASTATRIX AND ITS RAVAGES IN SONOMA VALLEY BY H. APPLETON.

SONOMA, August 28th, 1880.

On the 19th of August, 1873, an insect was found on the roots of grape vines by H. Appleton and O. W. Craig, in the vineyard of the latter, situated two miles north from Sonoma town, on the west side of Sonoma creek.

Samples of these roots were brought to the notice of the Vinicultural Society, at a meeting held in Sonoma, August 23d, 1873, and the following extracts taken from the minutes of the Club show what action they took on the subject:

"CLUB ROOM, August 23d, 1873.

"Mr. A. F. Haraszthy stated that within the last few days an insect, supposed to be the phylloxera vastatrix, had been found upon the roots of vines in Sonoma valley. That he had known of vines manifesting every symptom of the disease, as described, for many years in Sonoma valley; that the spread was but slow, and that young vines planted in the place of those that had died seemed to do well, and be free from any disease.

"On motion, duly made, seconded and passed, a committee, consisting of William McPherson Hill, A. F. Haraszthy, O. W. Craig and A. S. Edwards, was appointed by the Chair to visit such vineyards in Sonoma valley as they deemed necessary to fully ascertain whether the said insect could be found, and also obtain all information possible in relation thereto, and all members of the Club were particularly requested to furnish to said committee all the information they possessed and every facility in their power for the thorough investigation of the alleged presence and mode of attack of said insect.

"The thanks of the Club were extended to Mr. Appleton for information concerning the attack of said insect, and use of his microscope, and he was requested to have the kindness to act with the Club committee in their examination of the vineyards in Sonoma valley."

At the next meeting of the Club, held August 30th, the following report of said committee was made:

"The committee heretofore appointed to investigate the alleged attack of an insect supposed to be the phylloxera vastatrix, by their Chairman, William McPherson Hill, made a lengthy report of their examination of various vineyards in Sonoma valley, which report was received, adopted and ordered to be placed on file, and the

said committee were requested to continue their investigation and report from time to time as to any matter of interest that might be learned.

"The Secretary was directed to correspond with Prof. C. V. Riley, State Entomologist of the State of Missouri upon the subject, and to send any specimens of the insect as found here, with such explanations as to its modes of attack, etc., etc., as he may be able to do."

The following is the report of the committee:

"*To the President of the Sonoma Vinicultural Club*:—The undersigned, a committee appointed Saturday, August 23d, to make investigations as concerning an insect which it is said has lately been discovered on the roots of the vines in Sonoma valley, respectfully submit the following report:

"That they have visited and carefully examined, as far as their limited time and means would admit, those vineyards where it was said the insect had been found, as also other vineyards where there was reason to suspect from external signs its presence, and have come to the unwelcome conclusion, and do hereby report, that in their opinion an insect or louse has been found upon the roots of our vines in California, which is doing great mischief and threatening to work the most serious consequences to the vineyard interest; that without giving it as our positive opinion, there is strong reason to believe that it is the same insect which has within the last few years been discovered in the vineyards of Europe and the United States, where it has committed fearful ravages, and engaged the serious apprehension of the French and German Governments, as well as of all friends of the vine interest. The insect or louse is known in Europe by the title of phylloxera vastatrix, and in the United States as Pemphygus viti foliae.

"As the opinion of Professor Riley, the distinguished entomologist of Missouri, it is one and the same insect. The committee do not desire to speak positively on this head, as to the identity of the root louse we find in Sonoma and the phylloxera vastatrix.

"While there is strong resemblance between the insect here, as seen under the microscope, and the cut of the European, as shown in the Patent report of 1870 and 1871, yet it still may be a disputed question as to the identity.

According to the account of the phylloxera vastatrix as published in the Patent Office report, in speaking of its habits, it would appear, the great depredations are committed on the leaf of the vine, that through the growing season it lives above the ground in the foliage, and returns to the roots only after the leaves are exhausted and decayed, and remains in a torpid state during the winter, and when warmed into life and action by warmth of the spring suns, makes again its appearance above ground, attacks the young leaf, makes a harbor for itself on the leaf, deposits its eggs, propagates itself at a fearful rate, spreading over and destroying the foliage, after which it returns again to feed on the sap of the root. Your Committee do not find this the habit of the insect which we have examined here. We do not discover in any instance the insect in any form above ground, although the present may be said to be the growing season.

"We do not find the symptoms published, on the leaves of the vines affected, but in all cases the working of the pest appears to be confined to the root only. It would be an interesting point to know whether climate has any influence over the insect in this respect.

"The Committee therefore suggest a more careful investigation before the club shall decide that the phylloxera vastatrix or the gall louse of Europe and the United States, is really at work on the vineyards of California.

"Where this insect originated, or in what particular vineyard in Sonoma valley it first made its appearance, it is impossible for your Committee to say. One fact is clear to the Committee, that for a number of years, at least ten, in certain localities there have been vines showing *all* the symptoms of disease, decay and debility which are exhibited by those vines affected by the present insect. These external signs are the yellow leaf, short stunted growth, dead roots, and general death.

"It may be said that these are almost invariably the signs of diseased or debilitated vines, no matter what the cause, so that such symptoms are by no means special to the presence and operations of the root louse, but it may be said as a certain fact, that wherever we have found the louse, the symptoms mentioned invariably present themselves, if not upon the vine itself, still upon some surrounding vines. In many cases the louse was found upon vines apparently healthy, the growth strong and the foliage rich and green, but always in such cases there would be vines close hand at exhibiting the above symptoms; the insect appears to have deserted the dying vines, and sought the neighboring ones in search of fresh supply of food.

"The question has suggested itself to the Committee, whether the insect is not the result of debility or disease in the vine, rather than the cause of the disease, and whether this may not be a parasite growing out of the decaying system of the vine. The argument of this point would require more space than is consistent with the limited extent of this report.

"Whether the cause may be owing to bad culture, over bearing, want of drainage, late or bad pruning, drought, or some one of the many surroundings of vine culture, your Committee at this time will not consider. All these matters are submitted by us as deserving the serious consideration of the club.

"Upon the subject of prevention or remedy of the scourge, your Committee will hesitate to give advice. The deepest research (stimulated by enormous rewards) of the most scientific entomologists of the world, have failed to discover anything up to this time, to save from threatened ruin and destruction this great national interest.

"There are many considerations that might properly be brought within the compass of this report, but the Committee have thought best to leave further action to the club, and in conclusion would beg to urge the serious consideration of the club to the subject.

"All of which is respectfully submitted.

"SONOMA, August 30th, 1873."

"A. S. EDWARDS,
"WM. MCPHERSON HILL,
"O. W. CRAIG,
"A. F. HARASZTHY."

The vineyards that this Committee examined, where the insect was found, were those belonging to Messrs. Gauss, Wholler, Goss, Edwards, Maxwell, General Vallejo, Buena Vista and A. F. Haraszthy. These vineyards extended for about eight miles, North and South, and across the valley nearly two miles; particulars of these points of attack will be given in the history of individual vineyards.

Vineyards examined by said Committee where the insect was not found, were those of Messrs. Hill, Stewart, Gundlach and Dressel. At that time the phylloxera was known to be in the vineyards of Messrs. Craig, Appleton and Maj. Snyder.

In searching further the minutes of the Vinicultural Club, I find the following on this subject:

January 3d, 1874.

"The letter from Professor Riley, State Entomologist of the State of Missouri, to whom were sent specimens of the insect found upon the roots of grape vines in Sonoma valley, and supposed to be the *phylloxera vastatrix* acknowledging their receipt, but stating that they did not arrive in good order, and that he was unable to find any of the insects, and wishing further specimens to be sent, was read.

"Members of the club were requested to make careful search for further specimens and to deliver the same to the Secretary, who was instructed to forward the same to Prof. Riley." And at a meeting held by the club, July 11th, 1874, the following extract is taken: "The phylloxera Committee were called upon for a report, and Mr. Hill, as chairman, stated he had no written report to present, but that he was well satisfied that the insect was, and had been in our valley for many years as heretofore reported, and that he saw evidence sufficient to satisfy him that they were still at work in various localities; that as yet no practical remedy or prevention had been discovered; that the best minds of all grape-producing countries had been directed to the study of its habits in the endeavor to find out remedies and preventatives; that as yet the insect had not made much progress in our valley."

"Mr. Haraszthy reported that from December to May last, he had taken up between eight and ten thousand grape vines, and had carefully examined a great many of them but found none (insects) alive, but plenty of indications that they had been upon the roots; that he thinks the severe frosts of the past two years have had much to do with the sickly appearance and death of the vines; that in many places he has found little vines entirely killed by the frost and large ones sometimes killed near the ground which, when cut off, sprouted again and looked healthy; that as early as 1860 at the Buena Vista vineyard he found vines from time to time, dying, but they attributed their sickness and death to alkali which they had found to be quite strong in the subsoil."

"FEBRUARY 19th, 1876.

"Mr. Snyder moved that a committee be appointed to acquaint the Legislature (by means of petition, &c.) of the ravages of the phylloxera and demand from it that some remedies and materials be forthcoming, so that a series of experiments may be inaugurated. Carried."

From information received from Mr. A. F. Haraszthy and Capt. E. Cutter, (Superintendent of the "Buena Vista" Company's vineyards) I am able to give the following facts in regard to their large vineyards:

A vineyard of about 1,000 vines was planted in 1834 and '35 and was watered every year. In 1850 and 1852 the vineyard was largely increased and the system of irrigation was stopped. In 1857 about 200,000 vines were set out; and in 1858 100 acres were put in vines (680 vines to the acre.) Again in 1860, 50 acres were laid out. In 1862 Col. A. Haraszthy planted 70,000 European vines, and it was among these vines the disease increased most rapidly.

In the Spring of 1863 the Buena Vista Company was incorporated, and in the Spring of 1864 that company planted 100,000 vines.

As early as 1860 decayed and dying vines were noticed in the vineyard and they were taken up and others planted in their places. An examination was made to discover the cause of the disease in these vines, and it was attributed to alkali water, which was found a few feet under ground. The roots were decayed. No examination by microscope of these roots was made. Vines died from time to time, showing short growth, small and colorless grapes, early yellow leaves—in fact all the symptoms were observed of vines dying from the vine pest.

In 1868 about three acres of diseased vines were taken up (planted in 1850) on the north side of the dwelling house and new vines planted, which grew well, showing little signs of decay till they were four years old, at which time (1873) the Phylloxera Committee of the Vinicultural Club found the phylloxera on several vines. During the past five years the Buena Vista Company have inaugurated a system of examinations in the endeavor to destroy the phylloxera. These experiments were made in most cases very thoroughly, extending over from 10 to 1,500 vines, at a cost of $2,500 in labor and material to the company.

The most of these experiments were useless, and none of them gave general satisfaction in their results.

Bi-sulphide of carbon was thoroughly used for a number of years. In 1875 and '76, 400 vines were put under the influence of this chemical, forced under ground by a hollow tube and plunger, with three or four insertions around each vine. Experiments with bi-sulphide of carbon have been followed up to the present time; as many as 1,500 vines were under its influence at one time.

The Company also tried coal tar, coal oil, coal tar and gas lime mixed, carbolic acid, concentrated glycerine, bi-sul. of carbon and manure mixed, sulphuric acid and water.

J. O. Weatherby's remedy—Guano.

Hoffmann's remedy.

Dr. E. J. Fraser's remedy.

Liquid from tanned skins.

" " cow and other manure.

Des Cubes Rohart.

Whale oil and copperas, etc., etc.

Planting corn near diseased vines was tried, and the fact was established that the phylloxera was found in large quantities on the roots of the corn, and the vines seemed to recuperate under this influence.

Examinations were made and the insect found on the roots six feet under ground.

Vines were taken up, and the cuttings planted died the next year, and were followed by rooted vines which showed signs of disease when one year old.

A. S. Edwards' vineyard (commonly known as " Butler's " vineyard) of eighty acres, had dead vines in it during 1871–72, and in 1873 the Phylloxera Committee found the insect in a number of places. These infected vines were heavily manured for a number of years without staying the ravages of the insect. In 1876 the whole of this vineyard was abandoned, and has not been plowed or pruned since.

It was noticed that there was a check in the death of vines after it was abandoned. It is thought by many that this was caused by the hard ground preventing the insect spreading to healthy vines.

Many costly experiments have been tried in different parts of the valley, but as they did not accomplish the object desired, I need not mention them here.

The knowledge of the fact, that with the expenditure of large sums of money the most scientific minds of Europe, in their extensive research and experiments, have failed to discover *any practicable* method of destroying the phylloxera, has discouraged our vintners from attempting further experiments. We look to the State Commission on vine pests for enlightenment, First, as to those experiments in France which have proved failures, that we may not waste our time and money in repeating them. Secondly, as to what remedies have been most successful, that we may continue to work in those directions; and we still hope that the combined research of all parties interested will result in final success.

Respectfully,

H. APPLETON.

APPENDIX D.

History of the Orleans Hills Vineyard and its Diseases

By J. Knauth.

Sacramento, Cal., 1880.

In 1853 I imported from Nassau on the Rhine, in Germany, fifteen varieties of grape vine cuttings. They arrived in good order, and were first planted in my garden, near Sutter's Fort. They flourished splendidly, and were largely propagated while showing not a single trace of any sort of disease. In the winter of 1859–60 I established the Orleans Hills Vineyard, in Cache Creek Cañon, and so named it from the Orleans grape which then so largely predominated. Most of the vines forming the new vineyard were those taken up from my garden and transplanted in Cache Creek Cañon. In fact none others were procured or planted by me at that time. Some few thousand vines were planted on the low land, or what was still better just at the rise of the hill. Where the soil was of a stiff clayey nature, the vines did not flourish so well as those on the hill where the soil was more loose and chalky. This was particularly noticeable with those vines having naturally tender roots, for they were left behind and continued to stay behind. Removing and re-planting for several years did not do any good, and finally I abandoned that kind of work on that part of the ground, and in a few years there were but few alive except the strong-rooted ones, and they seemed sickly because of the death of their late companions. However, this sickening of the vines continued, and was slowly crawling up the hill, showing itself more plainly in the lower parts of the undulating ground where the soil was heavier.

I dug up several plants and examined their roots with a powerful glass, finding many of the roots formed into something like knots, and giving conclusive proof that something had been doing damage. I also found several small insects familiar to me, but not being in the habit of looking for lice, I did not find the phylloxera, or, if I did, I failed to recognize them. What were noticed, however, were numbers of small ants of a whitish color on every vine which was dug up. What were they doing there? They never go where there is nothing to be harvested. It is well known that the larger kinds of ants will clean off, as clean as a pin, blankets or other material infected with parasites of any kind, and why may they not prove a remedy for the phylloxera. These ants do nothing but good, and in our vineyards they should be protected rather than destroyed.

Some vines, the *Zinfandel*, for instance, were bought, I think, in Napa, for the Orleans Hills Viticultural Association, but they were planted sometime after the first establishment of the Orleans Vineyard.

J. KNAUTH.

[N. B.—Professor Behr shows that the ant follows the *aphis* to milk it; hence Mr. Knauth is probably wrong in supposing it to be the enemy of the *phylloxera aphis.*]—Committee.

APPENDIX E.

Carbon-bisulphide for the Phylloxera—By John H. Wheeler.

There have arisen of late many arguments in favor of the manufacture of carbon-bisulphide on the Pacific Coast, and it is pursuant to the advice of the Viticultural Commission and to that of Professor Hilgard, of the University of California, that its manufacture is now begun. Professor Hilgard has for some time urged strenuously upon the people the necessity of the reagent as well for vermin, squirrels, etc., as a remedy for phylloxera, Now that the work has actually begun, much is being done to bring it before the public. The St. Helena wine-growers on November 6th passed a resolution to recommend the bisulphide as the best known remedy for phylloxera, approved of the author's investigations and pledged him encouragement by every means in their power. Other encouragement has been given and the scheme has so far met with general approval.

The further one goes into the study of the bi-sulphide the more favorable it seems as an insecticide. To the chemist, its superiority is immediately apparent. As a poison, the vapor acts immediately upon small animals, vermin and insects generally, but the larger animals, it affects but little. Used as a liquid it immediately turns to vapor, which by virtue of its great specific gravity sinks immediately to the desired spot. Its strong odor serves many useful purposes—a warning to prevent its explosion or excessive inhalation. It has resisted practical proof during five years past; it is cheap and contains one of the ingredients found in nearly all proposed insecticides, viz: sulphur, and it seems to fill the requirements most admirably.

The materials from which carbon bi-sulphide is made are sulphur and carbon in some available form; the main principle of their combination is simple, but owing to the poisonous nature of its vapors and to the easy volatility of the liquids, together with its explosibility, there arises considerable expense incident to the condensing, storing and transportation. It is stored and transported in heavy iron barrels, the expense of which becomes considerable—in consequence it is impracticable to import the bi-sulphide; it must be made here. The location of the works is at West Berkeley, at a point convenient for shipping by water or rail to all parts of the State. These works will begin on the 13th of December, producing 12,000 pounds per month—this large capacity is chosen to lessen the price, for with this quantity a great economy of fuel, labor and sulphur is effected—it is not expected that this quantity will at first be used monthly, but to effect the above economy this factory will not run continuously. From this point the bi-sulphide is to be delivered free on board cars or boat at eight cents per pound; this rate is to apply only where a quantity is taken sufficient to supply half-acre vineyards or of greater extent, viz: 142 pounds or more; for squirrels and experimental work 12 cents per pound will be

charged to pay for immediate handling and vessels used. Now making our estimate on this according to directions for use, as deduced by the French, we have the following as the cost of carbon bi-sulphide: Thirty-two grammes per square meter, the greatest amount necessary, if divided between two applications, to totally extinguish the phylloxera, is equivalent to 285 pounds. per acre; this at eight cents per pound, makes a cost of $22.80; or, again reckoning for each vine, supposing our vines 6½ feet apart each way, which makes about 1,000 vines per acre, we have per vine 4.56 oz. at eight cents per pound, which makes a cost of 22.8 cents per vine. It must be borne in mind, that although we have made an estimate per vine, the vapor is not to surround the vine only, but to completely fill the whole body of the soil between the vines, as well as at its tap roots, in order that not one of the insects shall escape its effect. For vines at different distances apart, different rules must be observed for dividing up the quantity per acre, which therefore, when determined by the Commission or experiment, will be tabulated and go with the directions which accompany each barrel. The smaller expenses I have not entered into here, they being so inconsiderable and differing in different localities. The price has varied in San Francisco between 36 and 60 cents per pound. The lowest at which it can be purchased here now is 28 cents per pound. The lowest figure I have been able to get is from Eastern chemists, who furnish bisulphide at 9 cents per pound; adding to this $18 per 1,000 pounds for the iron drums in which it is transported, and a heavy cost of transportation, and we are precluded from its use unless manufactured here. The means adopted in our manufactory of selling the bisulphide will be identical with those in France, viz: on ordering a lot, a deposit will be made as security for the barrel, which on return of the barrel in good condition will be refunded to the purchaser, thus saving the consumer the expense of the vessel.

Regarding the instrument with which the bisulphide is injected, the latest improvement used in France will be had, a sample of which is expected daily. The cost of the injector is, in France, $8; a slight advance on this will be the cost in California. It is proposed to keep constantly on hand at the manufactory at Berkeley a supply of injectors to be sold or rented. The injector consists of a steel tube pointed at its lower end and attached to a zinc tank above. The whole is of a convenient length and has a cross-piece for a handle above the tank; below the tank and attached to the steel tube is a projection on which to apply foot power in inserting the instrument into the ground. When arriving at the proper depth a button on top is struck sharply with the hand, which, by means of an arrangement within, forces out from the bottom end of the steel tube the amount required for each injection. Care is required in the filling and use of this instrument, but any ordinary workman can manipulate it without trouble. The work is done very rapidly. Two men being required; one to use the injector and the other a tamper, which is an iron bar with a heavy end, by which the hole made by the injector is chocked or sealed up. These two men make 300 injections per hour, and require three days to do one acre of vineyard.

With the object in view of preparing the bi-sulphide for phylloxera, it has become my province to investigate the application of the insecticide. To do this I have made a thorough study of the leading authors among the French, who having

had the largest experience with both the insect and its remedy seem most competent to instruct. The work of the *Comité Regional* instituted under the auspices of the *Campagnie de Chemin de fer de Paris à Lyon et à Medeterranée*, has been my special study—the result of which I endeavored to present to the public by a series of articles published in the *Pacific Rural Press*, beginning with October 23d. Articles have been published by me in various other papers from time to time as I found new and valuable matter to add to the first. With this knowledge of the use of bi-sulphide and with the interest I have in the viticultural industry of California, being myself a member of the St. Helena Vine Growers, I shall make it a point to pursue the dreaded phylloxera to the very utmost. Much depends on the accuracy with which the directions in all particulars are complied with. It therefore becomes my special aim to see that the first use of the insecticide is made *correctly*. Ever following the dictation and advice of the Commission, I hope we may, after a fair trial, say with Professor Marion, Professor of the Faculty of Sciences of Marseilles and Member of the Superior Phylloxera Commission, "That we are in possession of a complete and efficacious remedy for the unwelcome phylloxera." About the 15th of December the first application of bi-sulphide will be made in Mr. Weinberger's vineyard, near St. Helena. A number of other places have been spoken for, and from these I propose to make a complete canvass of the phylloxated districts, to operate on all those vineyards where the remedy seems acceptable. Regarding the best time for the application, the French use the winter months mostly, but this may vary and will be directed by the Commission and experience.

Very respectfully,

JOHN H. WHEELER.

APPENDIX F.

[Translated from the French by MISS ANNA LOUISE WETMORE.]

INSTRUCTIONS OF THE PARIS-LYONS AND MEDITERRANEAN RAILROAD COMPANY, FOR THE TREATMENT OF VINES WITH BI-SULPHIDE OF CARBON.

§ I.

CARE AND PRECAUTION TO BE USED IN THE EMPLOYMENT OF BI-SULPHIDE OF CARBON.

Whatever may be the dangers that can result from using the bi-sulphide of carbon, they are certainly not of a nature to exclude this powerful insecticide from viticulture. It is sufficient to call to mind that during the whole season of 1877, in the course of which great quantities of bi-sulphide of carbon circulated over the entire network of the Company, and were delivered into the hands of so great a number of workmen, not one serious accident occurred. It is just to attribute that faborable result to the careful instructions prescribed last year, instructions which it is expedient to reproduce here.

Bi-sulphide of carbon ignites with the greatest facility. The vapors which it evolves, even at an ordinary temperature are dangerous to inhale. Their quantity augments rapidly with the heat, and, moreover, they form with the air an explosive compound, like those of petroleum, of alcohol, and like illuminating gas. To protect one's self from the accidents which these dangerous properties may entail, the following precautions are indispensable, and cannot be too highly recommended to the attention of viticulturists. The care required for the management and use of the cask forms the subject of special instructions, which will be forwarded with each cask. The workmen charged with the management of the bi-sulphide of carbon, ought, in every case, either at work, or in proximity to the apparatus and the casks, to keep themselves, as much as possible, protected from the emanations, and to abstain expressly from smoking. It is necessary for them to understand clearly that the vapors extend far out, and that a spark would be sufficient to cause a formidable explosion.

Moreover, the injecting apparatus must be filled directly at the faucet of the cask, and no one should be permitted to carry the sulphide of carbon away in any other way. If, for the treatment of a distant vineyard, it were deemed proper to intrust the cask to the workmen, it would be indispensable to conform strictly to the directions given in the special instruction concerning the use of the cask. It may

happen that an injecting apparatus being out of order, it needs to be soldered. It is necessary to see, before bringing fire near that instrument, that it does not contain in its interior a vestige of the vapors of sulphide of carbon. The injector should be completely filled with water, then emptied and left open to the air for some time.

PRINCIPLES OF THE TREATMENT OF PHYLLOXERATED VINES.

Studies made during the year 1876 led to recommending successive applications of bi-sulphide of carbon in the months of April, June, September, October and November.

Experienced had proved that a single injection sufficed, in many cases, to arrest the action of the parasites of the vine and to bring about a perceptible improvement in the vegetation; but it was evident, on the other hand, that the underground colonies of phylloxera multiplied themselves anew in proportion to the quantity of insects spared by the insecticide, to a degree that it became necessary to check this new attack by the subsequent treatments. These four treatments thus distributed through the year, cannot be precisely carried into effect in all viticultural regions. For example, in 1877, in the greater part of the fields in the South of France, the applications of summer and autumn, on account of an excessive drought, met with insurmountable difficulties.

The agricultural work of these two seasons raised the price of hand labor very much. The scientific studies instigated by the company come happily to prove that these treatments are most indispensable.

Two operations only are absolutely necessary to the viticulturists:

1st. It is necessary to destroy the young hibernating phylloxeras which, established on the roots, perpetuate from one year to another the underground colonies.

2d. It is expedient to arrest the multiplication of the insects of the new generation, which, in the second half of the month of May, descends from the stems to the roots, and occasionally appear in new spots.

Consequently, two treatments must be recommended—the first in the course of winter or at the beginning of spring; the second during the last week of May and the month of June. It is well understood that this last may be, if necessary, continued into summer, until the season or the resistance of the soil arrests the operations.

As to the first applications, it is well not to make them at the time when the new growth of the vine is beginning, as it might be impeded by the vapors of the sulphide of carbon.

These treatments, to be complete, should be in separate doses, that is to say, each should comprise two successive injections, with an interval of six days in winter, and only four days in spring.

In each operation only about fifteen grammes of sulphide of carbon to the square metre should be injected. (See the special instructions for the distribution of that quantity of sulphide.).

In thus applying twice a dose of thirty grammes of bi-sulphide of carbon, an insecticidal effect, much more complete than by injecting the same dose in a single operation, will be obtained.

This result has been clearly proved by the special experiments recorded in the general report published by the company.

The method of repetition realizes a true economy of sulphide, which can be easily accounted for, if we consider that the maximum treatment requires only the annual employment of sixty grammes of sulphide to the square metre, whereas the four separate operations involve an outlay of from eighty to a hundred grammes without producing as complete results. This new method is not based only upon the experiments of the laboratory, it is based equally upon extensive practical culture.

The maximum treatment, such as has just been explained, applies more specially to vineyards in which is proposed as complete a destruction as possible of the parasite. Viticulturists will understand that it is easy for them to combine the moderate treatments according to the different circumstances of the case.

They will obtain satisfactory results with a repeated treatment in winter, followed by a simple application made in June, at the rate of twenty-five grammes to the square meter.

They may, furthermore, confine themselves, in winter as in June, to making repeated applications in the badly affected spots, and a single treatment in the parts slightly affected.

In all cases, when the operation is performed in spring, it is well to commence in the center of the affected spots, so that if the work is hindered by drought, the parts most phylloxerated may not remain without treatment

INSTRUCTIONS TO BE FOLLOWED DURING THE TREATMENT OF THE VINE.

It has been said already that it is sufficient to apply suitable doses of bi-sulphide of carbon to the phylloxerate vines, to see vegetation very soon recover its vigor. As soon as the number of underground pucerons is sensibly diminished, the roots produce new fibers, the functions of which soon furnish the plant with the elements of repair.

It is understood that this phenomenon will be more or less rapid, according to the physical condition of the plant, and that it will always show itself in direct connection with the effect of the sulphide on the parasites.

The treatments stated above are assuredly of a nature to check and even to annihilate the action of the pucerons, by destroying their colonies; but their results will be much more perfect if, in the mean time, a suitable manure is used.

In one of the fields of experiments of the company, at Cap-Pinède (Marseilles), the rapid regeneration of old vines, which had not yielded any harvests for several years, under the influence of the bi-sulphide of carbon, and of a nitrogenous and potash manure, developed superb canes, and yielded fruit again from the first year of treatment. It would be expedient to add to the ordinary nitrogenous manure a salt of potash, similar to the chloride of potassium of commerce.

To spare viticulturists all difficulties in this respect, the company will engage to deliver free, at the railroad stations, chloride of potassium, under the following conditions:

A sack of 100 kilog. at a cost of..... .....F. 23 00
" " " 10 kilog. " " ..... " 2 30
Plus 50 centimes for the sack.

The dose to be used for each vine is about 20 grammes, so that 1 kilogramme should be enough for 50 vines.

The chloride of potassium should be mixed with a manure, or in default of a manure, with a certain quantity of earth, and be applied around the foot of the vine.

It may be advantageous, in certain cases, to resort to chemical manures, composed according to rules known to agriculturists, and containing at the same time ammonia, phosphoric acid, and chloride of potassium.

Viticulturists, however, will choose the method of manuring according to their convenience.

It is sufficient to point out to them the importance of this agricultural operation.

Perhaps some may wish to apply the manure to the vine at the time for top-dressing. It is important, in every case not to stir up the soil previous to the injections of bi-sulphide of carbon, and not to commence cultivation until at least fifteen days after the treatment. Experiments have proved that the vapors of sulphide of carbon do not last as long nor act so well in loosened earth as in compact soil.

Therefore, it is equally important to compactly close the holes made for the injection.

This last recommendation cannot be too much insisted upon.

§ II.

DISPOSITION OF THE HOLES FOR THE INJECTION ACCORDING TO THE DIFFERENT SYSTEMS OF CULTURE.

Observation proves that the roots always reach from one plant to another, so that not a single part of the vineyard can be considered as free from the phylloxera. It is therefore necessary, to obtain complete insecticidal effects, to introduce the sulphide of carbon into the soil, in such a way that the distribution of the vapors may be as uniform as possible. To realize this condition, it is necessary to arrange the holes for the injection by first taking account of the surface of the field. Thus, when it is a question of 20 or 25 grammes of sulphide of carbon, it is necessary to assign them to each square metre and not to each plant.

In the adjoining tables will be found figures indicating how, according to each method of planting, a sufficiently regular distribution may be obtained.

In order to conform to the prescriptions contained in these tables, it is necessary for the workman to introduce the rod of the injecting instrument, as much as possible, vertically in the ground and in places corresponding to those designated in the annexed diagrams.

It is evident that the distribution of the sulphide would be modified, if the apparatus was inserted obliquely, sometimes in one direction, sometimes in another.

One should always endeavor to make the rod of the injector penetrate as deeply as possible.

It is necessary to remark that the doses indicated in the table have been calculated for fields, the plants of which, being still insufficiently vigorous, may endure an abundance of the vapors of bi-sulphide of carbon.

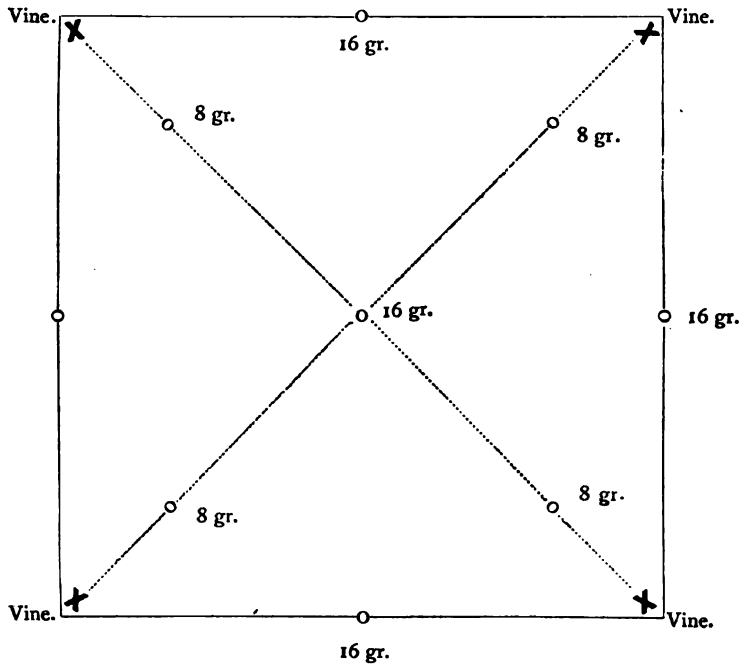
The resistance of vines to the action of bi-sulphide of carbon is assuredly much

greater than one would think at first; it is certainly beneficial, if the plants one proposes to treat are already very weak and present but few roots, or if one is operating on very young vines, not to come up to doses of 25 grammes per square metre for the simple treatments, and of 30 grammes for the repeated treatments.

ILLUSTRATIONS OF METHOD OF TREATMENT WITH BI-SULPHIDE OF CARBON.

NOTE.—The illustrations given by the P. L. & M. R. R. Co., are for vines planted at distances of 1, 1½ and 2 metres apart. As our California vineyards are not planted generally with less distance apart than 2 metres (6¼ feet), we shall copy only the methods applicable to such distances of 2 metres.—*Translator.*

FOR PLANTATIONS TWO METRES APART—FIRST MODE OF TREATMENT.



INSTRUCTIONS.

Surface occupied by each vine four square metres.

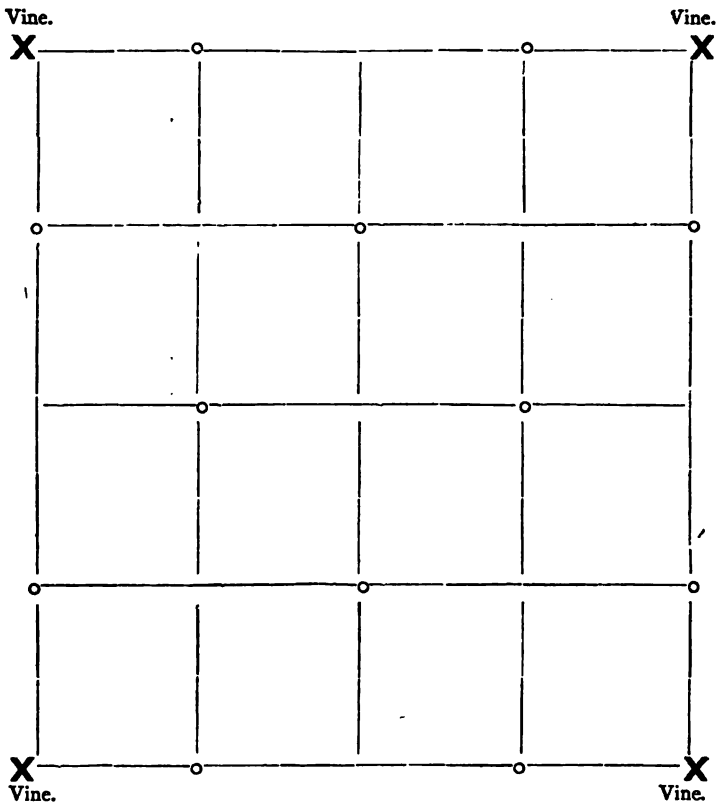
Injecting Holes (marked o)—First series on diagonal lines $\frac{40}{100}$ of a metre from the vine; 2d series oa the lincs of the squares one metre from the vines; 3d series one hole at the intersections of the diagonals.

DOSES TO BE APPLIED.

For One Simple Treatment—Eight grammes for the holes on the diagonals, excepting at the intersections; 16 gr. for the others.

For Repeated Doses—Five grammes for the first and 10 grammes for the latter.

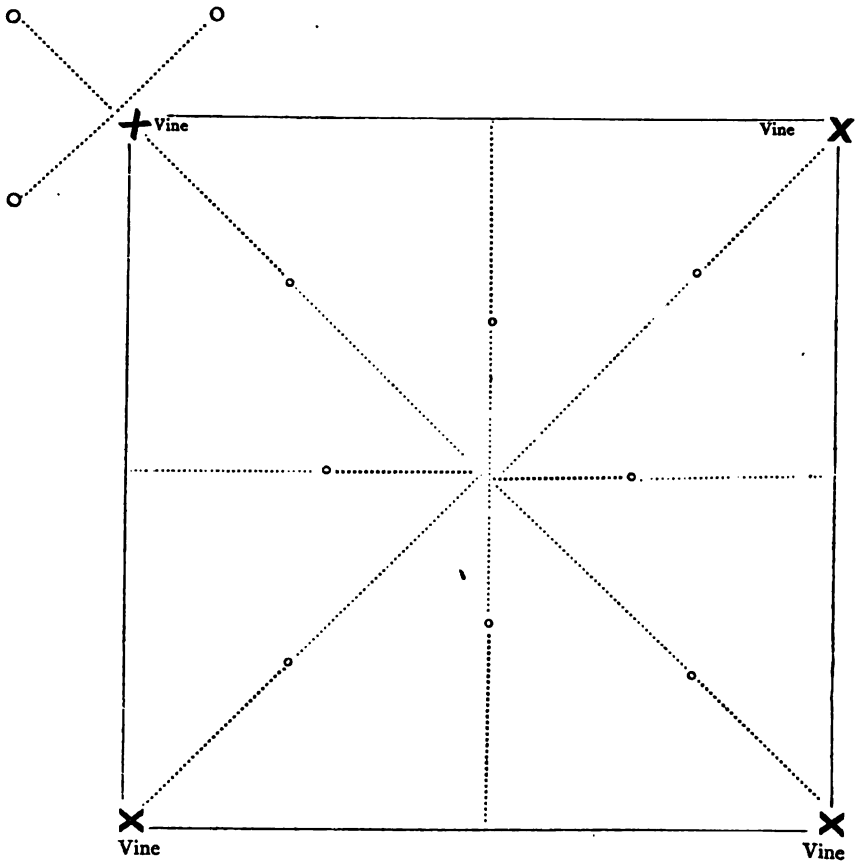
SECOND MODE OF TREATMENT.



Holes made half a metre from the vines at right angles and at one metre apart on the lines parallel with the vines,

Doses.—For simple applications, 12 grammes to each hole; for repeated doses, 8 grammes.

THIRD MODE OF TREATMENT.



HOLES—Four placed 40-100 of a metre diagonally from the vines; four placed on the parallels to the vines each half a metre from the centre. Same doses as in the second mode.

§ III.

DESCRIPTION OF THE GASTINE POINTED INJECTOR.

The pointed injector for bi-sulphide of carbon, is a kind of compression pump of a special form, inserted in the axis of an iron tube serving for a stake.

The end of the instrument is of a conical form to facilitate the penetration; it is made of steel. The upper part is provided with two horizontal branches or handles used for taking hold of, or forcing in, the apparatus. Under the handle is found a zinc reservoir which contains the provision of bi-sulphide of carbon necessary for feeding the pump, and immediately beneath the recipient a pedal serves to complete the action exercised above on the handle.

The stake being forced into the soil to the greatest possible depth, the injection of bi-sulphide of carbon is procured by a single movement.

It suffices to press with the palm of the hand the large flat button which terminates the rod of the plunger beneath the recipient; this plunger lowers rapidly in the feeding chamber, the upper part of which is provided with a Bramah leather fitting which assures a uniform discharge.

The plunger drives out, through a narrow opening situated at the lower extremity of the stake, a proportion of bi-sulphide of carbon equal to the volume displaced.

To diminish the dose, it suffices to abate the progress of the plunger. This result is easily obtained by adding or withdrawing one or more copper washers, which, by being thrust upon the rod of the plunger, diminish the length of its course.

The height of these movable washers is calculated so that each of them represents exactly a gramme of bi-sulphide of carbon. The instrument, without any washers yields 10 grammes of bi-sulphide of carbon at a stroke of the piston. By placing a washer upon the rod, this dose is diminished one gramme, and by adding 2, 3, 4 or 5 washers, one has, instead of 10 grammes, 8, 7, 6 or 5 grammes.

The operator can therefore very easily arrange the delivery of the instrument according to the dose recommended in the tables of treatment. As to the management of the apparatus, it is very simple.

The workman drives the point in by pressing at the same time on the handles and on the pedal until he has reached the resisting bed of the ground beneath; with the right hand he presses quickly on the flat button terminating the rod of the piston; he then withdraws the injector and shuts the hole of injection by vigorously beating down the soil with his foot.

To drive the point in, to press on the head of the rod of the plunger, to withdraw the point, and to press the soil down firmly, such are the different kinds of treatment with the injector.

To understand this brief description well, it is necessary further to know certain details of construction.

A large spring in a long coil is placed around the rod of the plunger; its use is to raise the latter above the barrel of the pump after each injection; by this means the instrument prepares itself for the expulsion of a new dose, and the operator has but one movement to make in place of two.

The bi-sulphide of carbon gets into the barrel of the pump through several little orifices which are alternately covered and uncovered by the passage of the compressing plunger.

At the lower part of the stake, in the piece of steel supporting the cone, is found inserted a fixed valve which opens only under the force of the downward pressure.

This valve consists of a clack-door acted upon by a spring. One can very easily examine this essential organ by unscrewing the steel cone; but, to impede the issue of the sulphide, if the apparatus was filled with it, at the instant when one wishes to perform this operation, the plunger should be lowered and kept in that position by means of the ball in the box of the instrument. In this position, the plunger prevents all issue, and takes the place of a true faucet.

The upper part of the instrument, which supports the handles unscrews in such a way that it is easy to take the plunger out to wipe it off and grease it carefully every day after work. This little cleaning should be done with a soft, dry linen

cloth, and with proper oil, or, if preferred, with glycerine; one should never use emery paper, glass, sand, rotten-stone or other corrosive substances.

The operator will be very careful to stop up the orifice of the recipient, so that, while working, the sulphide does not escape, and not a particle of earth or gravel drops into the apparatus.

The injector is an instrument made sufficiently solid, and capable of operating for a long time without getting out of order, provided the recommendations given above be properly carried out; but it is easily seen that, if, on account of too great a resistance to the penetration of the soil, the instrument is used as a lever, by acting laterally on the holders or handles, the perforating tube will be bent, and the soldering of the recipient be dislocated.

The effect produced would be much more serious if the pointed tube was raised by the handles as high as the shoulders, to be afterwards hurled violently into the ground, as if it operated like a stake or a mining bar. The instrument might be rendered useless at the first stroke.

In case the soil might offer too great resistance to the penetration by the process given, that is to say, by acting simultaneously, by simple pressure on the handles and on the pedal, it might be absolutely necessary to use a crow-bar to make the holes.

It is as easy to understand that the mechanism will be deranged, at the outset, if there is let into the reservoir, or introduce into it any of the soil, any muddy water, or any other product containing solid matter susceptible of being entangled among the metalic pieces very carefully polished and adjusted.

The reservoir holds 4 kilog. and 550 grammes of bi-sulphide of carbon, say about the necessary quantity for 433 holes, work for a third of a day.

The apparatus, filled with bi-sulphide of carbon, weighs 9 kilog. and 100 grammes.

The pointed injector will be delivered to viticulturists at the departments of the Rhone and the neighboring departments, at the cost of 40 francs, taken to the terminus, packing and accessories included.

APPENDIX G.

BI-SULPHIDE OF CARBON.

(Material abstracted and translated by DR. J. I. BLEASDALE, *Secretary of the Viticultural Commission.)*

QUESTIONS RELATIVE TO THE USE OF SULPHIDE OF CARBON TO DESTROY PHYLLOXERA VASTATRIX, ADDRESSED BY M. FREMY TO M. THENARD, THE EMINENT CHEMIST, WHO FIRST PROPOSED THE USE OF IT IN 1869, EXTRACTED FROM THE COMPTES RENDUS, JULY TO DECEMBER, 1879, TOGETHER WITH HIS REPLIES THERETO.

M. Thénard was the first to propose the use of sulphide of carbon for the destruction of phylloxera, in 1869. "Knowing that some of M. Thénard's vines were threatened with phylloxera," M. Frémy says, "I asked him if he still had confidence in the remedy which he had proposed—if its efficacy had been established by positive experiments, and if he himself had employed the sulphide of carbon to arrest the progress of phylloxera?"

M. Frémy proceeds, saying, "My own opinion is far from being settled, and to establish it, I shall feel only too happy if he can reply to the following questions which apply equally to the employment of all other kinds of insecticides:

1st. We know that sulphide of carbon will kill phylloxera, but it might kill the vine as well. Can we secure the former while we avoid the latter?

2d. Is the application of bi-sulphide of carbon easy and practicable? Its action on the human system is formidable; might it not interfere with the health of the vignerons?

3d. We are told that by sacrificing one-third of the revenue derived yearly from a vineyard, the other two-thirds may be saved, provided sulphide of carbon be used. Is this fact thoroughly established?

4th. Can M. Thénard point out any localities where the phylloxera has already been exterminated by the use of sulphide of carbon? I should like, above everything, to be shown a plot of vines preserved from phylloxera, by sulphide of carbon, *after a certain time*, while those which surround the treated ones have completely perished?

5th. Finally, I would ask if the qualities of our fine wines will not be altered by the repeated application of sulphide of carbon, and if this agent will not at last render the soil barren by acting on the mineral elements which enter into its composition?

Reply of M. THENARD *to* M. FREMY'S *questions relative to the employment of Sulphide of Carbon for the extermination of Phylloxera.*

I reply to the questions of my eminent confréré and friend with all the greater satisfaction, because the results of treatment have proved quite favorable; are authentically established; and because I have had something to do with the success myself.

The sulphide and the bi-sulphide, was put down in holes made in a furrow, into which was placed a dressing of the oil-cake of hulls of peanuts, after the oil had been extracted, and then covered with a ploughed furrow.

Two experiments were made—one by the late Dr. Chaigneau, and the other by M. Cahussac.

In the *first* the dose calculated upon a co-efficient of 15.00 kg. to the hectare were put in holes made with mallet and crow-bar, at distances from each other of 0.40 meter to 0.45 meter. The effect on the insect was astonishing, but half the vines were killed also.

In the *second* the quantity was diminished to 6 kilogrammes.

The results proved satisfactory, and if we had had, like M. Marion, the happy idea of repeating the operation, five or six days later, our experiment would have been as complete as were his with his repeated application.

From this time forward I troubled myself no more about the success of sulphide of carbon, except to ask M. Balbiani to ascertain, if, in view of the resistance which the insect is capable of offering to the sulphide, the young eggs of the phylloxera would not escape the destructive vapors.

By-and-by we shall see the happy results obtained by M. Marion by working out this observation.

All I had to do with this matter was to throw out useful hints, and the credit of success belongs M. M. Allés, of Marseilles, who by using small quantities and repeating them every month, during five months, has saved his vineyards; and at the same time has convinced M. Talabot, who since then has induced the great Company, P. L. M., which he manages, to avail themselves of it, and spare no expense to probe its efficacy to the bottom, (*La couler à fond.*) Besides M. Marion, Professor in the Faculty of Marseilles, Messrs. Gastine, Molére, Catta, Balbiani, Cornu, and Boiteau have added much to our knowledge of the insect and the mechanical means of best applying the sulphide of carbon.

ANSWER TO THE FIRST QUESTION.

Bi-sulphide of carbon is employed under three different conditions.

1. If we have to treat an isolated patch, which we may unexpectedly meet with in a vineyard situated at a considerable distance, from an infested district, we immediately proceed to extreme measures in applying what is called treatment

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Metre=39.37 inches.
Hectare=10.000 square metres=2.471 acres.
Kilogramme=2.204 pounds avoirdupois.
Gramme=15.432 grains.
Litre=2.113 American pints.

à mort. It consists in making 100,000 (cent mille) injections of sulphide per hectare; to the amount of about 700 kilogrammes. Then repeat the same after six or seven days.

This repetition is rendered necessary on account of the resistance which the young eggs offer, and which having escaped the first treatment, may hatch and re-people the vineyard.

This royal treatment (traitement *à mort*) is had recourse to only on relatively limited small patches, demanding only a small sacrifice in exchange for a great benefit. It is a splendid invention. The Swiss, wiser than us (French), use no other method, and after five years, during which their vineyards have been attacked, they have not yet lost as much as a dozen hectares.

2. When, in consequence of the want of surveillance, or disinclination, or ignorance on the part of vineyardists, instead of one patch we find several, which by their position indicate a general invasion of phylloxera, the above royal treatment has become impracticable; then we have recourse to preventive treatment; the quantity to be used is reduced from 1,400 kg. to 600 kg. at most, injected as before on two different occasions; but in larger quantity about the centre of the attacked patches than the outside. This treatment is generally adopted from the end of June to the end of September, while the vineyard, being in full vegetation, offers the least resistance; thus the special object is to diminish the number of winged insects, which begin to appear about that time and spread;—or if the season be too far advanced, as in September, to reduce the evil caused, by the increase of the pest, which however difficult to account for, does occur at this season of the year.

In order to prove thoroughly useful, even though the richness of the soil were to surpass that of Clos de Montrachet, one of the most fertile that M. Joulie has ever analyzed, the preventive treatment ought to be accompanied by a manuring of at least twelve tons of farm-yard manure to the hectare, or their equivalent in chemical manure. This *absolute* necessity for manure would appear to be indicated by the following consideration:

It is by the roots that phylloxera attacks the vine, and it is by throwing out new roots that the vine has to recover itself again.

3. If, without having been able to discover phylloxera, as it happens in my case this year, a vineyard is situated close by another where an infected patch has been discovered, the utmost prudence suggests cultural treatment.

The proper time for it is during the winter, after the vintage and until the return of vegetation. Generally it consists of only one injection of from 250 kilog. to 300 kilog. of sulphide of carbon, divided into 30,000 holes, though the more careful vineyardists prefer to apply the above quantity twice in 20,000 holes the first time.

Manuring, though not theoretically required, as it is in the preventive treatment, is indispensable, for we run great risks in under estimating the limits of an invasion of the pest; in fact it is often far wider spread than we imagine. As for the rest, the cost of the manure being covered by the increased crop, it is madness to neglect it.

REPLY TO THE SECOND QUESTION.

We have already mentioned that the *pal Gastine* protects both the workmen and the vine perfectly from the sulphide of carbon. I may add that the bi-sulphide

is brought on to the ground in sheet-iron casks of 100 kilog. each, to which we adapt an ingenious form of stopcock (robinet) which prevents any loss.

REPLY TO THE THIRD QUESTION.

The annual cost of cultural treatment, per hectare, in giving it two injections of 150 kilog. each, is 364 francs, viz.:

Sulphide of carbon 300 kilog., at 40 francs	120 francs.
Labor, 32 days at 2 fr.	64 "
12 tons of manure, or its equivalent, at 15 fr.	180 "
	364 fr.

For vines habitually treated with the above quantity, the sum of 180 francs is to be deducted; when not so, it must be let stand, because the increased returns of fruit cover it. Consequently, the additional expense is yearly 184 francs, answering to 11 or 12 per cent. of the price of the wine, if we accept the data of 100 hect. at 20 francs each, for common wines of the south; 28 hect. at 55 francs each, for the great ordinary wines; and 12.5 hect. each for the grand crus of Burgundy. But if the vines are severely attacked, and if it be necessary to treat them at least twice, once in winter, and again either in spring or summer; and that during two or three years, without obtaining hardly any fruit, there will be a nearly dead loss of from 700 francs to 1,700 francs.

This shows how important to the vineyardist it is to lose no time.

REPLY TO THE FOURTH QUESTION.

The Company P. L. M. publishes accounts annually of details. If my memory serves me, the quantity of sulphide disposed of has been 1,700 kilog. the first year 20,000 kilog. the second, 100,000 kilog. the third, 240,000 the fourth, and the actual quantity used now amounts to 450,000 kilog. Into the sand and gravel of Médoc and l'Aubrion, we believe the phylloxera would not penetrate. Now, if there be any place where the vine appears to resist it better than another it is at Chateau Lafitte. But happily, since its first appearance, M. de Rothschild has energetically combatted it with the means of which we are speaking and with the concurrence of MM. Catta and Lieutand.

As a conclusion on this point, we say that, wherever the Pal Gastine can penetrate, if the ground be of sufficient consistency to be made solid by the action of the rammer (or demoiselle) used to stop the holes made by the Pal, there is every reason to expect success. Unfortunately, it only too often happens, that when everything else has been well done, the rammer is not sufficiently used, so that the sulphide evaporating too rapidly never reaches the insect, and only scorches the leaves of the vine.

REPLY TO THE FIFTH QUESTION.

As far as concerns the sulphide of carbon, cultural treatment produces no effect on the quality of the wine; but we cannot say so much about the manure which must accompany the sulphide.

The preventive treatment, when had recourse to shortly before the vintages, certainly does distress the vine, and likewise hastens the ripening of the fruit; which like a "*fruit vereux*," has not the qualities of healthy fruit. Necessarily the wine suffers; not that it gets that detestable (*affreux*) taste imparted to it by sulphuring the vine; but it has a certain greenness, is less spirituous and is of a *mauvaise santé*. In relation to this, it is not desirable to have recourse to the preventive treatment until compelled to do so.

REPLY TO THE QUESTION OF IMPOVERISHING THE SOIL.

Sulphide of carbon has no action on the components of the soil; it neither dissolves nor fixes anything in an appreciably sensible degree. It disappears so rapidly that there is no room to fear ill effects, like those which result from employing sulpho-carbonates, except with the greatest care.

These last, in effect, since they dissolve almost instantly in the soil, as M. Rommier has demonstrated, cause the loss of a quantity of humus, nearly twenty times the weight of the alkaline sulphur set at liberty.

N. B.—The Académie will learn with satisfaction that this savant, turning this loss to profit, is about to publish a work immediately from which the cultivators of common vines will, without reducing in any way the fertility of their vineyards, derive assuredly some profit. (Comptes Rendus, p. 931, Anno 1879. Séance du Lundi, 1re Decembre, 1879.)

ON THE METHOD OF APPLYING SULPHIDE OF CARBON FOR THE DESTRUCTION OF PHYLLOXERA. A LETTER BY M. BOITEAU, DELEGATE OF THE ACADEMIE, TO M. DUMAS. SÉANCE 26 JANUARY, 1880.

From investigations made in the course of last year, it results that since sulphide of carbon is one of the most destructive agents of the root systems of the vines, there has arisen the necessity for modifying the use of it, and for working the problem "*how effectually to kill the phylloxera with the least injury to the vine.*"

Its destructive effects, to which I called attention early in 1879, referred to the use of it in the Gironde. Since then I have visited the South of France, and have satisfied myself that the same accidents occur in all the various climates as were noticed in the Gironde. I observed them in the Herault.

There is now no longer a doubt that great care indeed has to be taken against these destructive effects—but which we can now render harmless. Quite recently I caused some old vines to be rooted up which had received last year their first application of sulphide of carbon. It was an easy matter to account for what had taken place when I inspected the root systems. All the roots above 0.05 metres, were totally mortified in the vicinity of the injections. It would be rash to deny facts like these, which might prove so ruinous to the proprietors of vineyards, byle aving them in the belief that sulphide of carbon is perfectly harmless to the vines. What I deduce from these proofs is that without abandoning the only remedy which can help us, we should convince ourselves of its dangerous effects, and discover among the various ways of employing it—those which will most certainly kill the insect

without hurting the root or vine. As a general rule it would be safer for a few insects to escape for the present, than to attack the root-system too energetically.

All that we should aim at effecting is to destroy the greatest number possible of the insects with the smallest number of injections of sulphide. There is, however, a limit beyond which we cannot go.

The vapor of sulphide of carbon radiates to a distance, which might amount to more than 1.50m; but its effect as an insecticide does not in any case exceed 0.35m or 0.40m at most. It is therefore necessary to make at least two injections to the square metre. This minimum quantity cannot be reduced if the effects are to be relied on. It is also requisite that injections be so disposed as not to attack the system of roots in the whole circumference of the vine; in order to leave as many rootlets as possible intact. All treatment which proceeds on the idea of surrounding the vine with a girdle of injections, must be put aside. Reiterated injections, with all the holes changed, are productive of the largest number of deaths among vines. It is equally as bad as the plan of making an injection at the very root of the vine. This last has afforded the very worst results.

In order to avoid, as far as possible, all these accidents, the following will be found applicable to all vines, whatever be their distances in the rows. It consists in making the injections in lines parallel to the rows of vines, keeping to the right and left of them, at distances that may vary according to the width of the rows, but which in no case ought to be less than 0.25m to 0.30m. These distances variable between the interlines, are not so in the sense of lines; and by these we take the maximum distance between one hole and another, which ought to be of 0.70m or 0.75m. By this means we have parallel bands which have no injection holes. The rows of vines are between these bands, and their roots may run there without danger of poison. The number of lines of injection varies between each interline of vines, according to the width of these. The injections ought to be made at a maximum distance of 0.70m to 0.75m. There ought to be as many lines of injection as there are times 0.70m or 0.75m in the interlines. It will soon be seen that the distances are not regular multiples of the numbers which modify the distances, and by consequence the quantity to be injected. If the remedy acts efficaciously on the insect, it is by being injected in determinate quantities per square metre. The quantity which has seemed to us to give excellent results varies between 16 grammes and 20 grammes per square metre, and at two injections.

If the operation has to be gone over a second time, or oftener, it is necessary to use the same holes as before, to not increase the chances of accidents.

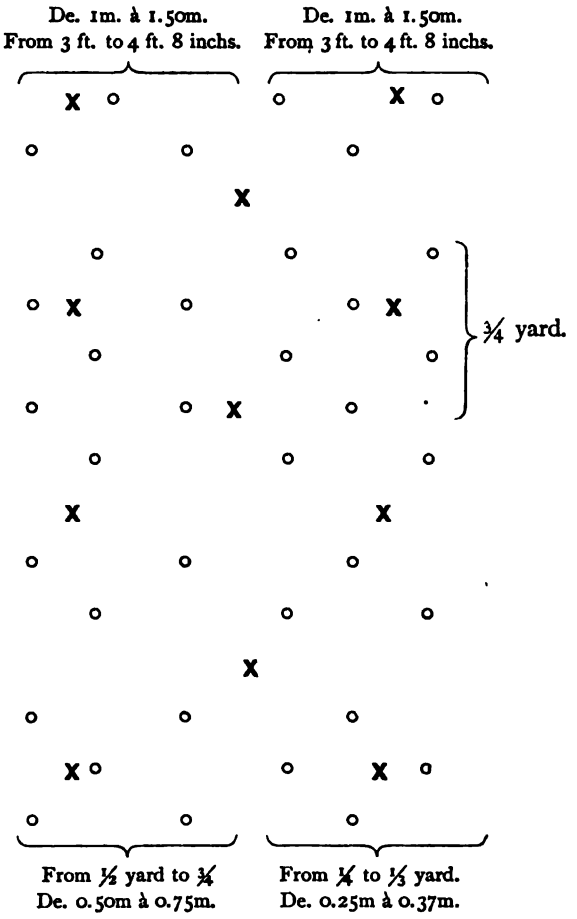
In simple treatment, repeated from year to year, one should, as far as possible, use the same holes.

After what has been said, the following is the advice we would offer to the operators:

Generally where the vines are planted at distances of from 1m. to 2m. and from 1m. to 1.50m, it is necessary to make two lines of injections; and in from 1.50m to 2m, to make three.

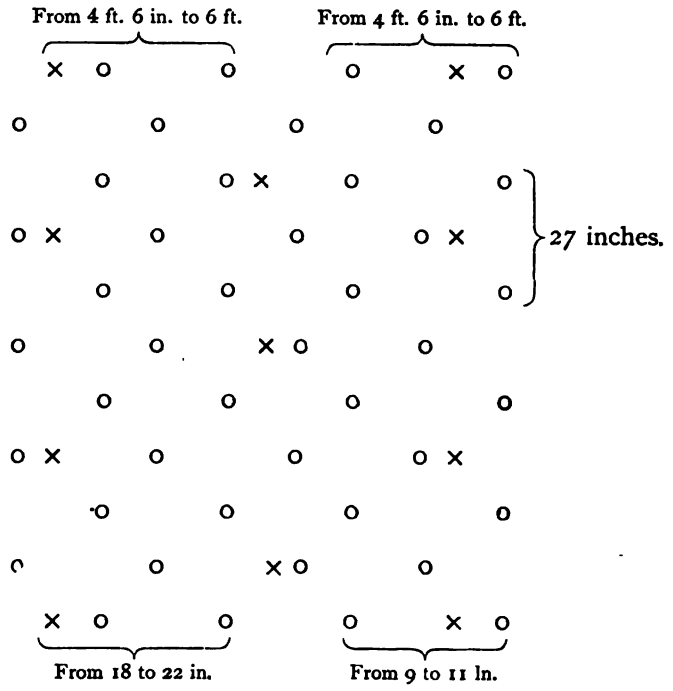
In plantations of 1m. to 1.50m there are many conditions which cause the number of injections to vary, and require different quantities. It is the same with plantations of between 1.50m and 2m.

The following figures show the position of injection holes, when the vines are planted at from 3 feet to 4.8 feet apart, and from 4.8 feet to 6 feet :



In the interlines the distances of the holes vary from 1 foot 6 inches to 1 foot 9 inches. Of the injection holes in the line of the vines the holes vary from 9 inches to 14 inches. In the sense of lines, the injection holes have a mean distance of nearly 27 inches. The number of injections per acre will vary from about 7,600 to 11,600. From these numbers of holes, which are the extremes of many means of intermediate distances, we arrive at the quantities of bi-sulphide of carbon to be injected

From	1 yard	to	44 inches.....	108	grains =	7	grammes
"	44 inches	to	50 "	120	" =	8	"
"	50 "	to	56 "	139	" =	9	"
"	56 "	to	66 "	150	" =	10	"



In the interlines the distances of the holes vary from 18 to 22 inches. Of the injection holes in the lines of the vines, the distances vary from 9 to 11 inches. In the direction of the lines the holes have a mean distance of 27 inches. The number of injections per acre varies from 8,760 to 11,600.

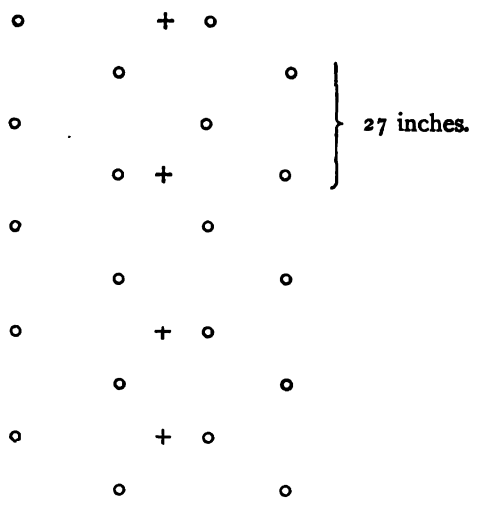
From the above numbers of holes, which represent the extremes of many means of intermediate distances, we deduce the following as the quantities of bisulphide of carbon to be injected, viz :

From 54 to 58 inches..... 92.58 grains = 6 grammes.
" 58 to 68 " .....108.00 " =7 " each injection.
" 68 to 71 " .....120.00 " =8 " " "

If the rows of vines are not set out at regular distances, we should calculate the quantity to be used by the distances shown in the tables; and if the irregular spaces alternate regularly, we may take the mean of two interlines and work according to it.

In plantations of two or three rows of vines, the work is to be done as above; but it is necessary to make behind the last row two lines of injection, the last one at 27 inches in every direction.

Where the vines are planted in single rows the injection holes should be made at a distance of one foot from the line of vines, but it is also necessary to make two lines of injection holes on each side, the last at twenty-seven inches distance the whole way.



The dose of sulphide ought to be 139 grains = 9 grammes. The holes are stopped up by the laborer, by stamping with his foot over the hole.

M. Boiteau continues: "Sulphide of carbon destroys insects, only when they are upon the roots, or portions of the vine covered by about two centimeters (say four inches) of earth. Those insects which are resting on the crown of the root, or upon the bottom of the upper roots, nearly always being killed, they thus become the principal of the re appearance of phylloxera in summer.

In order to be perfect and complete, the treatment of sulphide of carbon should be assisted by a painting or smearing of the lower portion of the plant and the base of the first roots, in order to kill those which have escaped the vapors of the sulphide of carbon.

This very inexpensive operation may be performed during all winter. But whenever it is done, care must be taken that the buds of the vine have not started, and this takes place, in France, generally in April.

In order to facilitate the action of an insecticide solution, it is best to raise the earth from around the vine, so as to form a basin, exposing the crown of the first roots.

As insecticide agents, we can avail ourselves of the various sulpho-carbonates either pure or in fifty per cent. solution; or, again, of solutions whose base is heavy oil of coal-tar. The following is the one I recommended as being both very effective and not injurious.

Slacked lime made into moderately thick, smooth paste, 5 parts; heavy oil of coal-tar, 1 part. Mix them together as masons mix mortar, so as to incorporate the substances perfectly. The result will be a black paste of a very penetrating odour, and of a greater or less consistency. This paste should be kept in a cool place. When we proceed to use it, we mix it with eight or ten times its volume of water and stir it up vigorously with the paint brush, with which it is afterwards to be applied. Use any common bucket, which the workman can carry in his hand. It is desirable to give the liquid a stir up every time the brush is dipped in. This mixture holds the coal-tar oil in complete solution, and does not clog the brush; it cannot injure

the vine. The crown of the root and the base of the first (or sun) roots should be well smeared with the solution, and a portion of the liquid allowed to flow round the principal root *(racine pivotante)*, and the earth taken out to bare the root.

If sulpho-carbonates are to be used, the method of employing them is the same ; but in this case it is necessary to replace the earth immediately to prevent any escape of vapor. With preparations, the base of which is the heavy oil of coal-tar, this necessity is avoided, and the earth may be replaced afterwards.

APPENDIX H

An Abstract of the Work of the Phylloxera Commission of the French Academy of Sciences.

[Translated by Dr. John I. Bleasdale, Secretary of the Viticultural Commission, from the reports for the years 1872–9 inclusive.]

From Comptes Rendus, 1872.

January to July, 1873.

JULY TO DECEMBER, 1873.

JANUARY TO JUNE, 1874.

JULY TO DECEMBER, 1874 (INCLUSIVE.)

69. M. Ch. Juge—By manure, viz: dung or rags, &c., is thrown in heaps in the vineyard and salted with sulphate of lime and precipitated phosphate of lime and wetted with water. This was used upon sandy land with other chemicals, in trenches..... 459

70. M. Delfan—Proposes to employ a decoction of walnut leaves and deadly nightshade, with tobacco, to the bared root of the vine..... 572

71. M. A. Richard—Recommends fine sawdust charged with turpentine.... 573

72. M. Gauthier (Challons sur Saone } Use of aloes..... 573

73. M. Desforges—Bare the root and treat it with soap suds; or put near it at some depth bits of soap, which the rains will dissolve and wash down..... 600

74. M. Pettit—Lime from the gas works..... 600

Experiments were conducted at Cognac, on attacked vines, with coal-tar, recommended by M. Petit. Note by Mouillefert: They proved a failure in every instance; but some phylloxera were found dead. M. Balbiani appears satisfied with his experiments, but they are contradicted by those of M. Mouillefert.

After vapor of sulphide of carbon, the most effective remedies appear to be the sulpho-carbonates of potassium and sodium. Dumas suggests a method of preparing them commercially without the use of alcohol—851.

N. B.—The difficulty about the sulpho-carbonates lies in their not being sufficiently easily diffused about the roots of the vines.

For methods adopted to discover the most efficacious means of destroying phylloxera, see notes by M. Max Cornu, pp. 1042, 1040, 1189, 1314, 1388. He arrived at the conclusion that the best were cyanide K and Co. K—1388. The cyanide, however, could not be used by laborers on account of its poisonous properties on man.

Pasteur thinks it possible that the propagation of a *filamentous mycellium* on the roots of vines would destroy phylloxera. A letter from Herr Schuetzler, concerning the vine disease at Cully, states it to be the *mycelium* of a mushröom *(champignon)*, p. 1234.

Experiments on healthy vines with poisonous matters, by M. Baudremont, p. 1392.

Comptes Rendus, 1874, July to December (inclusive).

Note.—On the comparative composition of the vine in health, when attacked by phylloxera, by M. Bautin.

	Healthy Vines per 100.		Phyllox. Vines per 100.
Bark, fresh roots (cane sugar).....	2	.....	0
" " (Glucose).....	0	.....	1
Fresh roots, without bark (Albumen).....	2	.....	0.6
" " " Oxalic acid.....	17.80	.....	4.04
Roots dried at 100C., pectic acid.....	6.20	.....	1.90
" " " Tannin.....	9.60	.....	7.68
Small roots (radicelles) carbonate, K O....	1.48	.....	0.428
" " " total ashes.....	6.42	.....	12.85

Leaves gathered in June and dried at 100C	carbonate of potassa	1.35	.....	0.72
" " " "	total ash..	8.80	.....	2.95
Dry leaves collected in September, Co. K_2O.		0.72	.....	0.39
" " "	total ash.	13.25	....	13.00
Cuttings dried at 100C., carbonate K_2O..		1.99	.....	0.26
" " "	total ash.....	3.45	.....	3.49

COMPTES RENDUS JANUARY TO JULY, 1875.

M. Girard states that phylloxera on vine roots in situ were inclosed in metal tubes and exposed to a temperature of 6 to 10 degrees below zero without any perceptible effect on them (p. 436.)

M. P. P. Mestre describes a process for using sand (558.)

Long note by M. Marés on results of experiments made in 1872, 3 and 4, all leading up to the use of vapors—especially sulphur in some form; chiefly derived from alkaline sulphates (pp. 1044, 5–8,)

M. Dumas italicises the following sentence in his communication to the Academie Séance, 19th April, 1875:

"Alkaline sulpho-carbonates are the most energetic substances against phyl-"loxera, which have hitherto been proposed, and consequently merit the closest ' attention of all concerned in the re-establishment of our vineyards.

"When I proposed the employment of those salts, I had already satisfied myself that the substances, whether mineral or organic, with which they might come in contact in the soil, would have no action on them;—that carbonic acid would decompose them, giving rise to a disengagement of sulfhydric acid and sulphide of carbon, the destroyers of insect life; that any animal placed near those salts, whether solid or dissolved, would be quickly killed; finally, that solutions of them sufficiently diluted would exert no perceptible action on the plants whose roots were wetted by them." (Pp. 1048–51.)

M. Pellet reports the good effects obtained by the use of sulphide of potassium and of sulphate of ammonia mixed with the ashes of burnt vine twigs (sarments) 1226.

M. Villedieu, la vase du Rhone avéc des sels alcalines and du sulfate d' ammoniaque. 1226.

M. Godet sends to the Academie the composition which he employs, viz: sulphide of potassim, $\frac{6}{10}$; saltpetre, $\frac{3}{10}$; bone meal, $\frac{1}{10}$; 30 to 50 grammes to 10 litres of water, and the liquid is poured over the vines.

M. M. Zoeller and A. Grete. Xanthate of potassa. Its action is however the same as that of the sulpho-carbonates. It is much dearer. 1347.

M. F. Moll recommends a solution of soft soap and coal tar against the larva of beetles and slugs.

COMPTES RENDUS JULY TO DECEMBER, 1875 (INCLUSIVE.)

July 26th.

M. M. Zoeller and Grete inform the Academy that their mode of developing sulphide of carbon is not tied to the production of a xanthate obtained by using ethylic alcohol; but that any other crude cheap alcohol does just as well.

"We shake together a concentrated solution of potassa (K O.) and crude amylic alcohol in equivalent quantities; then add sulphide of carbon and stir briskly; and we obtain quickly a solid salt, almost dry, which crystalized in scales;—the amyloxanthate of potassium. As to the action of this it is the same as ordinary xanthate. Repeated experiments in the use of it show that used in the quantity of one gramme mixed with super-phosphate it will produce no injurious effects on herbaceous plants growing in ½ litre of earth. For bushes (arbustes) when used in a dose above 7 grammes, they suffer." (Pp. 194–5.)

LETTER OF M. AUBERGIER TO M. DUMAS.

CHANZY, 30 August, 1875.

"Since the ground was already charged with wet, it was considered that eighteen litres would suffice for each vine; that would be thirty-six litres to the square metre. Fifteen grammes of sulpho-carbonate were dissolved in nine litres of water, and after this had been absorbed in the ground the remaining nine litres were poured in to ensure the diffusion of the poison all round and among the roots of the vine. The water used was the common water of the neighborhood. These experiments seem to have been quite successful. They did not, however, kill the eggs, as some of them afterwards produced insects.

"COST OF TREATMENT.

62 days labor @ 3 frs.	186 00	frs.
360 kilogrammes sulpho-carbonate	408 00	"
Cost of pipes and connections	105 80	"
Zinc buckets and small expenses	14 50	"
	714 30	for .72 hectare.

This makes 992 francs per hectare."

Apropos of the above, M. Dumas proceeded to remark:

"The confidence which I had in these salts (sulpho-carbonate of potassium), arising out of their composition and their properties, has been confirmed, and the effects of them may be summed up as follows:

A. Wherever the solution of these salts, or the vapors arising from them, penetrate, the phylloxera is destroyed.

B. The vine suffers no injury; on the contrary the green appearance of the leaves and the abundance of young roots (*chevelu régéneré*) testify to an energetic renewal of vegetation.

C. If we do find occasionally a few phylloxeras on the spots treated, they are young larvae, very lively, near the surface of the ground—possibly from neighboring vines not treated, or from some eggs concealed in the fissures of the vine, or of the ground, where they were sheltered from the action of the poison.

NOTE.—By M. Maurice Girard. Experiments made by himself and M. Boutin in the experimental grounds at Angoulême, showing the good effects of placing around the vine, just above the roots, a bed of sand or dust mixed with coal tar, so as to prevent the descent of the apterous insecst to the roots. This plan is highly spoken of by M. Balbiani, p 626.

D. The vine is freed from the insect, or at least placed in the condition in which it was when first attacked, which enables it to mature its fruit, and allows time for the vigneron to renew the treatment.

Two points remain. First, to reduce the price of sulpho-carbonates to their true cost, which rests with the manufacturing chemists. The second concerns the vignerons, who should work out the best methods for employing them."—785–9.

N. B.—It is reported that phylloxera vastatrix is not carried from place to place except on vines alone. My experiments prove that it may be carried in our clothing.—J. I. BLEASDALE.

COMPTES RENDUS JULY TO DECEMBER, 1875.

M. Mouillefert reports that the roots of vines treated with sulpho-carbonates in 1875 were quite healthy in January, 1876 (p. 317).

M. Garrveau proposes to employ the cultivation of insecticidal plants (p. 388).

At page 434, *et seq.*, a letter by M. J. Rouselliro to M. Dumas, describing a method of employing sulphide of carbon and giving a sketch of the instrument employed. He reckons that a laborer can make 4,000 holes per day with it, in ordinary ground.

N. B.—Superiority of sulphide of carbon to alkaline sulpho-carbonates. The latter stimulate the vine at the same time that they kill some of the insects, and cause a start of new rootlets; but these serve as fresh and succulent nourishment for the living, and especially the newly hatched phylloxeras; and this appears to explain the rapidity of the re-invasion of vines treated with sulpho-carbonates, upon which, some time after the treatment, we find the insects more numerous and more vigorous than before it was employed (p. 436).

NOTE BY MR. SABATÉ.—On scraping off the old dry bark of the vines; he believes that the eggs of the insect which produce the young brood in the spring are deposited in chinks and underneath the old bark. The work can be done by children. The result proved beneficial on thirty hectares, which were so treated, while forty hectares were not treated. All the vines (free from the insect) which were deprived of the old scaly bark flourished vigorously, and did not suffer from cold. The decortication was carried on through December, January, February, March and April, till the buds were ready to burst. There was no difference between those stripped before, during, or after, the colds, p. 438.

M. Th. Pignede to M. Dumas, on treatment with *lime* tried on vines quite unproductive and nearly dead: "During all March and the early days of April I dig "around the diseased vines a trench, ten centimetres deep and the same breadth, into "which I put two double handfulls of slacked lime; I then coat the whole plant "over with a brush with milk of lime; but having previously, with care, removed the "old outer bark. This triple operation destroys the most part of the insects and "eggs, which have been deposited on the vine, and prevents the insect coming from "an infested vine reaching the roots of one thus treated. This remedy is both pre-"servative and curative. I am persuaded that if applied to healthy vines it would "preserve them from phylloxera. I experimented this year on only 500 or 600 vines "very far gone indeed. *Ils sont aujourd'hui magnifique et portent de nombreux "raisins.*" 601.

M. Gachez writes to M. Dumas that he sowed red maise (maise rouge) between the rows of vines, suffering from the insects, and that they all left the vines and fed on the roots of the maise. 632.

M. F. Allies to M. Dumas, letter on the details of the application of bi-sulphide of carbon, p. 702.

M. Maumene claims priority for the recommendation of planting thyme between the rows of vines (p. 704).

M. J. François recommends to cease all cultivation of the ground as soon as phylloxera appears in the vineyard, and observes that the more the soil is wrought the faster does the insect kill the plant. 1147.

M. Alph Milius—An application of cyanide of potassium and potash, K & K O.

M. Boutin ainè—"At the departmental laboratory Angoulême, which is under my direction, I have just finished certain analysis which I had undertaken, with the view to ascertain what are the immediate principles which enter into the general constitution of American vines as compared with those which I have already found in French vines; but, mainly, to determine if there exist in the constitution of American vines some principle rendering them proof against phylloxera.

"Having discovered in all varieties of American vines a *resinoide* principle, to which I paid no attention during my study of French vines, I have instituted fresh researches to see if it does exist in French vines. I have proved the presence of this principle in French vines, but only half as much per cent. as in American resisting varieties, and one-third less than the quantity found in the non-resisting ones, which themselves contain only three-fourths of the quantity found in resisting vines.

"This fact, now well established, it seems to me, furnishes irrefragable proof that the power to resist phylloxera, is due to the large proportion of this resinous, or resinoide principle in those American vines. I will edeavor to determine, later on, the physiological causes which concur in the production of it, but henceforth we may safely conclude that to it the resistance is due. The other immediate principles found in American vines are, with one exception (malic acid), the same as those of our French vines; but, as will be shown further on, the proportions vary sensibly. The oxalic acid, which occurs in great abundance in the French vines, is replaced by malic acid in the roots of the American vines, and we find it there in far less proportion than oxalic acid in French vines.

"As I have endeavored to show in my first work on the analyses of French vines, everything leads me to believe, that it is a first oxidation of oxalic acid, which changes it into malic acid, and a fresh oxidation, when the fruit is becoming ripe, which converts it into tartaric acid.

"If we admit that the acid nature of malic acid, is stronger than that of oxalic acid, we may suppose that its presence in the roots of American vines contributes something to their power of resisting phylloxera.

"Below are the complete results of the analysis of the roots of an American resisting vine—the Clinton, placed alongside that of the roots of a French vine.

	American resisting vine roots of Clinton.	Healthy French vine roots of Folle Blanche.
Bark of fresh root, cane sugar	0.66	2.00
" " " glucose	0.34	"
" " " starch	1.35	5.85
Roots stripped of their bark, albumen	traces	2.00
" dried at 100 centigrade, tannin	4.80	9.60
" fresh without bark, malic acid	5.40	"
" " " " oxalic acid	"	17.80
" dried at 100 c. resinoide principle	8.00	3.95
" " (burned) carbonate of potassa	2.40	2.00

"Instituted researches in the fresh bark of the Clinton, a resister, Concord, a non-resister, and Folle Blanche; with results as under. All dried at 100 centigrade.

Bark of the roots of Clinton, resinoide principle	14.90
" " " Concord, " "	11.08
" " " Folle Blanche, " "	8.10
Roots stripped of bark, Clinton, " "	1.57
" " " Concord, " "	1.10
" " Folle Blanche, " "	0.739

CHEMICAL METHODS ADOPTED TO DETERMINE THE ABOVE POINTS.

"The root was dried and reduced to powder and put with sulphuric ether into a displacement apparatus;—the ether for the most part distilled off, and the residue evaporated over the water bath in a weighed capsule. The residue—resinoide, weighed, gave the percentage. This resonoide is solid, shining, slightly colored brown by some coloring matter. It burns like other resinous bodies, without yielding any distinctive odor; it is slightly bitter without being astringent; it is insoluble in sulphide of carbon; it does not appear to saponify with potash; it is solid at boiling water 212°, loses color and becomes white, but appears to undergo a modification, for it then becomes only sparingly soluble in ether. Boiled in concentrated nitric acid, violent action is set up with abundance of nitrous fumes. When this ceases, on evaporating it to dryness we obtain an orange-colored substance, very bitter; and when dissolved in water one of a very beautiful yellow. This last is picric, or carbozotic acid, and since there is no trace of oxalic acid, it is clear that it contains no tannin. This I believe to be the true principle, but, it must be present in quantity to become resisting to phylloxera, viz: 8 per cent. in the entire root; and 14 to 15 if we take the bark alone. When bitten by the insect this matter forms a cicatrix and stops the waste of sappy matters—a circumstance not met with in non-resisters. (Pp. 735–39.)

COMPTES RENDUS, JULY TO DECEMBER, 1876.

M. Alph. Rommier writes to Dumas, advising phenic acid and alkaline phenates to be applied to the vine, not to the roots (959).

Letter to Dumas by M. Lachanal, on the conditions requisite for the employing of insecticides for the destruction of phylloxera (962 *et seq.*)

M. J. Sabaté, referring to his note, August last, concerning decortication of vines by the use of a glove covered with wire, or wire gauze, states that the success is remarkable: Eight hectares of vines, sixteen years old, almost utterly destroyed in 1875, but decorticated last winter, during severe cold, have almost quite recovered, and are bearing fairly already. This treatment may be safely recommended. 1085.

M. H. Marès notes at length the results obtained by the use of sulpho-carbonates, with manure and compressing the ground. 1142.

M. C. Poussier recommends alkaline chromates in solution. 1167.

M. Foex, a long note on effects produced by phylloxera on American and European vines. 1218.

M. Rousselier, treatment of vines with a mixture of sulphide of carbon, heavy oil and rosin oil. 1219.

M. Mouillefert, results obtained at Cognac, by treating diseased vines with alkaline super-carbonates, and decortication followed by painting (badigeonage). 1224.

M. J. Laureau, on the power of wood charcoal to absorb sulphide of carbon and its employment. 1280.

Comptes Rendus, January to July, 1877.

M. Boiteau, describes minutely an instrument for employing sulphide of carbon in the subsoil. 21.

M. Fournet proposes to employ sulphide of carbon intimately mixed with heavy oil (l'huile lourde), or coal tar, but first reduced to the condition of dust, which can be easily done with burnt earth, soda, or plaster of Paris in powder. Before using the mixture we must add phosphate of lime, in powder, sulphate of iron, and if there be no wood ashes available, then sulphate of potassa.

M. P. Boiteau } (100 killogrammes per hectare, p 219.)
} describes the preparation and use of a liquid for painting a portion of the diseased vine, and gives drawings of the utensils required; preparation of materials:

Water	1 part.
Carb. of soda	1 "
Heavy oil	2 "

Boiled four or five minutes; let cool, and any loss replaced by water. (It is not easy to understand the details of mixing, diluting and applying without the diagrams. The aim is to kill eggs and insect by external application.)—J. J. B.

M. Rommier proposes salts or oxide of mercury, lead, copper, zinc and others, dissolved in alkaline hyposulphites (potash or lime). 380.

Prevention of the spread of disease.

By a letter dated 1st February, 1879, the Minister of Agriculture informs the Academie that, "repeatedly demands have been pressed on the Government with the view of having the Department armed with power sufficient for arresting phylloxera by the most extreme remedies. These demands come supported by the experiments made at Prégny, which appear to have been satisfactory. Under these circumstances the Minister of Agriculture applies to the Academie of Sciences for light on the subject, as follows:

1st. Ought we to consider the uprooting of infested vines and others for a certain distance all around, an efficacious means of arresting phylloxera?

2d. How far round the attacked vines ought this uprooting to be carried on?

3d. If we uproot diseased vines, as a measure of protection, ought we not to destroy American vines in all the districts not yet attacked?

4th. Should not the Government be armed with power to deal officially with diseased vineyards in districts where phylloxera has appeared?

The Academy replied as follows:

1st. To prohibit the exportation of vines from infected districts.

2d. To prohibit the introduction and planting of vines from infected localities in districts not yet invaded.

3rd. To destroy every point of attack, in districts not yet invaded, by scrupulously uprooting of the vines and their roots, and then and there burning on the spot both roots, tops, leaves and poles or props; in fact by perfect disinfection of the land.

4th. To disinfect the ground and the vines in the suspected circumference, all round the infected spot.

5th. To disinfect the vines, as a measure of precaution even farther back than the last named.

These conclusions were adopted by the Academie (pp. 428–432.)

M. Bageau recommends a solution of gutta percha or caoutchouc in sulphide of carbon (p. 488.)

M. Bouley corrects an error—it was the Canton of Geneva—not Switzerland, which stamped out and still keeps phylloxera out.

M., The President du Comice Viticole des Pyrénées—Orientales—believes that though some American vines will resist phylloxera, yet if even those be brought into a country there will always be phylloxera present. No vines from without, whatever, are allowed to be introduced there. (P. 600.)

M. Mouillefert still continues at much length recommending sulpho-carbonates. (Pp. 694-7.)

M. F. Geyrand—On a method of applying alkaline sulpho-carbonates under ground by means of a tool, drawings of which he supplies. (P. 701–2.)

Chemical note by M. C. Vincent, describing a new, simple and cheap method of preparing sulphide of carbon. (Pp. 701–2.)

Chemical note by M. Mercier—Describing a method of fixing sulphide of carbon, in drying oil—such as linseed. This is easily done: The substance is hardly inflammable at all; it can hold as much as 70 per cent. of sulphide, and will give it off as below, viz:

After 24 hours	.....	24 per cent of its weight.	
" 48 "	.....	26 "	"
" 72 "	.....	27 "	"

Note by M. Foex—Note on a comparison of the roots of American and native vines; and on the depth of the lesions caused by the bite of phylloxera, on each; determined by micrometry. (Pp. 922–3–4.)

M. Geoffroy, St. Helaire, suggests the leaves of eucalyptus globulus.

M. Gastine, on the determination of the diffusion of the vapors of sulphide of carbon as an insecticide in the ground. The material was injected into the ground

in small quantities and steps were taken to determine the breadth of the diffusion of the fumes and the duration of their presence. For this purpose the air was collected at varying distances from the holes of insertion, and made to pass into an alcoholic solution of potassa. The sulphide of carbon, in solution in the air is thus converted into xanthate of potassium. $CS^2X(C^2H^3)=C^2H^5KCO, S^2$. The proof is that we can precipitate the xanthic acid as a xanthate of copper.

DIFFUSION FOUND IN MARCH, 1877—DISTANCES FROM THE SPOT WHERE IT WAS INJECTED.

1st	March	0.30	metre.
2	"	0.30	"
3	"	0.70	"
4	"	1.00	"
5	"	0.60	"
6	"	0.40	"
7	"	0.25	"

The ground was moderately damp.

Experiments with like results were made in April, in both permeable and stiff clayey soils. (P. 1219.)

M. Boiteau—Note on the oviducts of phylloxera. (Microscopic work.)

COMPTES RENDUS, JULY TO DECEMBER, 1877.

M. Boiteau, note 21st July, 1877. The beneficial effects of sulphide of carbon are now placed beyond all doubt, wherever it is used with discretion and in proper quantities. The sulpho-carbonates of sodium and of potassium, the Rohart cubes, pure sulphur, sulphur mixed with coal tar, and the various mixtures devised this year have all proved effective as far as they were employed in a reasonable way. What I have been looking for is efficacy of the material and economy in the use of it. My own preferences all are for the use of sulphide of carbon in its natural state, and what I learn from all quarters is that sulphide pure will soon supersede all mixtures hitherto proposed (204–7).

M. Max Cornu—A long note on a disease of the grapes in the vineyards of Narbonne—a fungus (208–10).

S. H. Macagno, Director of the Œnologic Station at Gattinara, Italy—A note on the same disease. Its effects were very destructive during the preceding four years in various parts of Italy. It is carefully described (278, 279).

M. F. Granet sends a note on the influence of the common field daisy in driving away phylloxera (333).

M. L. Laliman reports an insect enemy of the phylloxera and M. Balbiani determines it to be a *Lyrphus*, the habits of which tribe have been admirably studied by Reausnur, who called them "*Vers mangeurs de Pucerons*" (507).

H. Marés—Note on the spontaneous disappearance of phylloxera. Some experiments conducted on some vines in pots. Nothing conclusive (564–5–6).

M. Dupesnoy—Extract of a letter. He used pyrituous earth, used for the manufacture of alum on 65 vines nearly dead, of which 56 recovered and are now quite healthy (608).

M. L. Porte—Ravages of Anthracnose or carbon in the vineyards of Narbonne (704–5).

M. C. Cassins—Preparation of sulphide of carbon as a solid by the use of gelatine (748).

M. F. Rohart claims priority in the above preparation (841).

M. Boiteau—Various observations upon phylloxera (932–3).

M. A. Blankenhorn on the natural enemies of phylloxera in Germany (1147).

Comptes Rendus, January to July, 1878.

M. Sabaté remarks on the advantage of removing the dry outer bark of the vine (*ecorçage*). (105.)

M. C. Cassins—A note relative to the use of sulpho-carbonate of ammonia in gelatine (299).

Agricultural Chemistry on the production of sulphurated oils having insecticide properties. Note by Loyére et Muntz (1185).

M. Portes—letter—I sulphur the whole vineyard every year. When on the 10th of May, in the morning, while dressing the leaves of a young vine three years old, I noticed that all the vines (*ceps*) without exception were covered with a vast number of small white points, which I had not noticed the preceding evening. I removed some of them and on carefully examining them I saw a black spot hardly visible to the naked eye. I dusted over every part of the plants common sifted lime (*chaux grasse criblée*). Next day all the spots, both white and black had disappeared. A modification of this was made by mixing the lime with sulphur.

OBSERVATIONS.

1st. Vines attacked slightly last year are nearly free this year.

2d. Vines completely ruined last year, are this year free from spots—the vegetation is splendid and the fruit abundant.

Between 10th May and 12th June these two operations were repeated three times. My experience is that sifted lime is the true remedy (p. 1559.)

Comptes Rendus, July to December, 1878.

Millardet—Note presented by M. Pasteur—A new theory of the damage done by phylloxera upon the roots of the vine. It attempts to show that a result of its action, besides producing nodosities and tuberosities, is the production of a fungus, whose mycelium is said to be always present, both in the bark and in the wood, and that is either the cause or the effect of the rotting (p. 197–8–9).

M. Maxime Cornu—Millardet's suggestion is not new. M. Dupont suggested it in 1873. The consideration of it was suggested by the Commission of the Academy. Vide Comptes Rendus, 30th November, 1874, p. 1234. The mycelium has nothing to do about the vines, healthy or not, except only accidentally in the destruction of the swelling (p. 247–8).

M. Ach. Livache—Note presented by M. Berthelot—on the abnormal solubility of certain substances in soaps and alkaline resinates. In these matters sulphide of carbon might be dissolved. Probably of some use as an insecticide (p. 249).

M. E. Picon proposes the use of assafœtida as a remedy.

M. le Secretaire Perpetuel, in noticing a brochure by M. Faucon, on the subject of submersion of vineyards, brought before the Academy the following directions as given by Faucon, viz.: To be effective, the submersion must be conducted in conformity with the following rules, viz.:

1st. Not to commence to run in the water until the wood of the tops is quite mature.

2d. The submersion must be complete, and not suffer the least interruption the whole time.

3d. The submersion must be continued during from thirty-five to forty days, if it be done in autumn; and from forty-five to fifty days, if it can be done only in the winter.

4th. It is essential that the water should have a minimum depth of from twenty to twenty-five centimetres; it would be still better if it covered the crown of the vine, just up to the spot where the pruning will be made.

5th. It is indispensable to manure with suitable substances. The more heavy the manuring, the better the result, and the larger the yield of fruit and of the net products. "As to other details I have," says M. Faucon, "nothing to add to my brochure of 1874."

M. J. Tabet proposes, or relates, a process of applying blood mixed with Palastine bitumen, diluted with olive oil (p. 375).

January to July, 1879.

M. Breton—Letter on the employment of the oil of asphalt (p. 73).

M. Dumas—A note on the preferential use of sulpho-carbonates (p. 75).

M. Boiteau adresses a very long letter to M. Dumas, on the action of sulphide of carbon on the root system of vines (pp. 895–901).

July to December, 1879.

M. Faucon to M. Dumas—A letter on the efficacy of submersion, giving evidence of it (p. 80).

Observations of M. Puel communicated by M. Pootes to M. Dumas on the treatment of anthracnose, in the vineyards of Narbonne, by the use of lime (p86–7–8).

M. Millardet—A note on vine-root rot. M. M. Schenzler and Planchon refer this fungus to the Genus Rhizomorpha. Planchon thinks R. fragilis, Roth. —

M. Rohart—On the slow and prolonged action of the vapor of sulphide of carbon on the vine (p. 555–6)

M. Pirotta—On the appearance of *mildew*, or false American oidium, in the vineyards of Italy. He refers it to *pérnospora viticola* (Berk. et Curt). It is well explained by Planchon, as regards France (p. 697–8).

M. Boiteau reports finding two fecundated winter eggs in the surface soil, both evidently alive on 12th September.. The first was attached to the underside of a small clod of earth (pp. 772–3–4).

COMPTES RENDUS, JULY TO DECEMBER, 1879.

M. Balbiani writes that the discovery of impregnated winter eggs of phylloxera by M. Boutin, is due to the circumstance of the insect being then and there pressed to lay her eggs, and not to any habit she has of selecting such places as a clod of earth, lying on the surface, for breeding (pp. 846–7).

M. J. Grisdon proposes fluoride of potassium (p. 850).

M. Valery Mayet—Observations upon the egg-laying of winged phylloxera (in Languedoc) (pp. 894–5–6).

(Minute descriptions and explanations.)

M. Mouillefert—A long note detailing the beneficial effects of sulpho-carbonate of potassium, and upon the method of applying it.

APPENDIX I.

GRAFTING AMERICAN VINES.

[Translated from the French by Mr. E. W. PAILHET.]

SYNOPSIS OF PRACTICAL LECTURES ON "GRAFTING OF AMERICAN VINES," COMPILED BY THE CENTRAL AGRICULTURAL SOCIETY OF THE DEPARTMENT OF THE HERAULT, AND DELIVERED IN LECTURES BY PROF. G. FOEX AT THE NATIONAL AGRICULTURAL SCHOOL OF MONTPELLIER, FRANCE, MARCH 8TH, 9TH AND 10TH, 1880.

INTRODUCTION.

The following work must not be considered as a scientific treatise on grafting of American vines; it has simply been published to allow agricultural students who may attend the practical lectures delivered at the agricultural school to obtain a succinct synopsis of the instruction given them.

In fact, with our actual positive knowledge of this subject, it would be premature to give a definite exhibit of it and to consider our instructions as absolute. The authors have tried to make a short and clear description of the processes most generally used, and which experience has justified the best. They hope that owing to the activity with which the knowledge of grafting is now being acquired, this publication will soon be far behind in improvements that may be made. They only hope it will be of some use at present and be the starting point of great and rapid improvements in the future.

CHAPTER I.

HOW TO SELECT GRAFTING STOCK—PLANTS ON WHICH VINES CAN BE GRAFTED.

The vine can only be grafted on the vine. Grafts which have been tried on the mulberry, clematis, blackberry, vigne vierge (*ampelopsis*), etc., have produced no results up to this day.

SELECTION OF VARIETIES OF AMERICAN VINES WHICH GIVE THE BEST RESULTS AS GRAFTING STOCK.

It is demonstrated by all the experiments made up to this date on American vines, that all, with the exception of the *Scuppernong*, will bear grafts of our vines. Experience has not yet proved definitely the value of the different varieties of vines in this point of view. The various varieties of the *Riparia* group (formerly *Cordifolia*) are at present selected in preference to all others as graft bearers on account of their small price and the easy rooting of their cuttings; nevertheless, certain *Aestivalis* such as the *Jacquez*, the *Cunningham*, the *Herbemont*, etc., make very good stocks, and can be easily utilized when they can be had with roots without too much difficulty, or in using the internode grafting process of Mr. Champin.

The most valuable variety amongst the *Riparia*, on accouut of its vigor, which allows it to grow easily in many places, is the wild *Riparia* (formerly wild *Cordifolia*).

VALUE OF AMERICAN STOCKS AS GRAFT-BEARERS FOR CERTAIN OF OUR VARIETIES.

This question, like the preceding, is now being carefully studied, and it is rather difficult to give a definite opinion concerning it; however, fine grafts of *Aramon*, *Carignane*, *Petit Bouschet*, *Veret noir*, *Cinsaut*, *Morrastel*, etc., have been observed on the *Clinton*.

It has been noticed that the *Aramon* has not given as good results on the *Taylor* as on the *Clinton*, but that the other French stocks mentioned above, and especially the *Terret Bourret*, the *Chasselas*, the *Muscat*, the *Olivette*, have prospered well on it.

The *Solonis*, seldom grafted upon to this date, supports the *Petit Bouschet* very successfully.

Excellent results have been obtained on the *wild Riparia* with the *Aramon*, the *Carignane*, the *Aspiran* and the *Cinsaut*.

We have found the same good results on the *Herbemont* with the *Aramon*, the *Carignane*, and the various varieties of hard wood.

The *Jacquez*, which has been but little used for this purpose, has fine prospects as a graft-bearer of our various varieties, and amongst them of the *Aramon*.

AGE AT WHICH THE STOCK CAN BEAR THE GRAFT.

When the cuttings are of a proper size, they can be grafted the year after planting them. In this case, the English cleft-graft should be used, and fruit may be produced the third year after the planting of the cutting.

Grafting may also be made either on ordinary cuttings before planting them, or on *internodes*, or rooted plants. Unfortunately, these last two ways of proceeding, which have given very satisfactory results in certain cases, have not succeeded as well as the first, when in our climate their use is generalized. In suitable spots, grafts made on cuttings will have the advantage of furnishing stocks which, when planted in a nursery and replanted the following year, with the part where they have been joined placed above the ground, will be in a good condition to avoid the chances of being broken apart.

CHAPTER II.

SELECTION OF THE GRAFT—SIZE AND APPEARANCE OF THE CUTTINGS.

The cuttings fit for being used as grafts must be selected from healthy and good bearing stocks. They must be well ripened by the summer heat, provided with all their eyes, be of middling size, and contain little pith. These last conditions, which are met with in cuttings from old stocks, are important to follow, as then the wood is less apt to split when the graft is driven into the cutting and the growth of the graft more certain. With cuttings from young stocks, which are softer and more easily dried, the chances of success are much smaller.

SEASON FOR MAKING THE CUTTINGS.

To be sure of successful grafting, the grafting stock should be in advance of the graft in progress of vegetation, and for this reason it is necessary to gather, before the rising of the sap, all cuttings that are to be used as grafts. This work must be done, at the latest, before the beginning of February.

HOW TO PRESERVE THE GRAFTS.

The cuttings chosen to be used as grafts are to be kept in places where they will neither dry nor be injured by the damp atmosphere, which would occasion vegetation. To realize these conditions, you can proceed as is done in the Herault, where the grafting stock is kept in cellars, and covered with sand, or bound in small bundles, which are placed upright in a trench of four and a half to six feet deep. This trench must be made under cover, or on the northern side of a high wall, and the cuttings buried in sand and covered with damp earth. When removed from the trench, they should not be kept in contact with the air, as they will dry much quicker than in ordinary circumstances.

HOW TO ASCERTAIN THE VITALITY OF THE GRAFTS.

When, after making a section of a cutting, the green layer under the bark is found dried or blackened, it is very probable that it has lost its vitality. The most accurate way of judging the quality of the graft is to place some of them, picked here and there in the bundles, in a vessel full of water and to leave them for a few days in a temperate atmosphere, in the sun if possible. If the buds swell and open or if water beads on the end of a section made on the upper part of the cutting, you can be sure that the cuttings are in a good condition to be retained.

CHAPTER III.

SEASON FOR GRAFTING.

As a rule, grafts after being made, ought to join quickly together ; now, as the connection of the graft will only begin at the time when the sap runs, it is preferable to wait for that time. Grafts made too soon run risks which it is important to avoid ; the uncovered tissues will dry, or undergo, according to atmospherical circumstances, other alterations which will prevent their connection, and, besides, the spring frosts

may in destroying the buds, or in suddenly stopping the vegetation, greatly compromise the future of the work. It is generally, during the end of the month of March and in the month of April, that grafting succeeds the best in our part of the country. If many failures were made in the year 1879 in the work done at that time in the Herault, they must be considered as the result of the exceptional amount of wet, cold and frosty weather.

FAVORABLE CIRCUMSTANCES FOR GRAFTING.

The best time to choose for this work is cloudy and temperate weather, but without rain, and it is important that the soil should be well mellowed to facilitate the earthing up of the soil around the plant.

CHAPTER IV.

SYSTEMS OF GRAFTING ADAPTED TO THE VINES.

Practically, grafting can only be done underground—grafts made above the ground seldom prosper, as the action of the air generally dries the parts in contact before they join together. Experience has also demonstrated that the various systems of cleft grafting are preferable to grafting by approach.

The best known amongst the former systems of grafting are: *The common cleft graft—graft à la Pontoise* or *by incrustation. English cleft graft—Champin—Fermaud heel graft, etc.*

ORDINARY CLEFT GRAFT (FIG. 1.)

To make this graft the stock is bared to facilitate the work, then it is cut at 1 or 1¼ inches underground and the part where the graft is to be placed slightly trimmed with a pruning knife. The cleft is then made with a chisel, manufactured for the purpose, or simply with a pruning knife if the stock is not too large. In the first case the chisel is placed a little back from the edge of the stock (fig. 1*a*) and when the cleft is ready its exterior part is widened as far as the chisel by cutting out of the cleft two small slips of wood just large enough to make a cavity to allow the graft to be tightly inserted.

Three eyes are left on the graft, and it is cut into the shape of a knife-blade (fig. 2), the two bevellings starting from the base of the lower eye. One should avoid as much as possible uncovering the pith on both sides, so that more solidity may be preserved in the part which has been trimmed. The graft is then firmly inserted into the cleft, slanting it a little in such a way as to have a place where the bark of both intersect each other notwithstanding the difference in their size. Then the chisel, which in the second part of the operation has been used to keep the cleft open, is removed.

This system of grafting is more especially applicable to stocks of a certain age, and consequently of a pretty large diameter. As for those of a smaller size, where the wood is not sufficiently elastic to hold the graft with security, the cleft is only made on one side, with a pruning knife (fig. 1 *b*).

Under the same conditions, the graft known as the *graft à la Pontoise* can be used, the only difference being that instead of splitting the stock, it is hollowed

with a pruning knife, or a gouge made especially for that purpose, making a cavity to insert the graft (fig. 3).

THE ENGLISH CLEFT GRAFT.

To make this graft it is necessary to cut the stock sloping at the level of the ground with a pruning knife, or one made for that purpose, and split it again vertically at the upper third part of its diameter. The graft is cut in the same manner, and the loosened tongues mutually inserted in the slips, but it is necessary to make the barks coincide as well as possible, at least on one side (fig. 4), as it may often happen that the graft is of a smaller diameter than the stock. The parts are afterwards kept in contact with a tightly fastened ligature.

THE CHAMPIN GRAFT (FIG. 5).

Is a modification of the English cleft graft. It is made in the following manner: The stock cut perpendicularly to its axis is split to about two-thirds of its diameter, and the thickest part cut in an elongated bevel up to the higher part of the slit. The same is done with the graft, which is wedged and bound in the manner which we have already described.

These two last processes have the benefit of being applicable to young plants of a diameter which does not much exceed that of the cuttings used as grafts. Sprouts, or internodes rooted by layering, and the ordinary cuttings can be utilized and in certain cases, by these means excellent results can be obtained. The work can also be done indoors during most of the winter, but it is necessary to cover the grafted stocks with a thick layer of sand, as the grafts are made, to preserve them up to the time of planting them.

GREFFE A TALON.

This sort of graft is done in the following manner: The stock is cut and split in the same way as in the common cleft-grafting, the graft carefully selected of a slightly curved shape, and provided with a heel (*talon*), is edged off in the middle and on both sides in the shape of a knife blade (fig. 7); it is then inserted into the cleft in such a manner as to make the barks correspond exactly and have the *talon* placed in a good position to root. (Fig. 6.) Mr. P. Fermaud has modified this former process. The stock is cut and split, and a portion of the wood forward of the cleft is removed with a gouge made especially for the purpose of making a sharp bevel on one of the sides. At about the lower third of the graft a tongue of wood is detached and the bark removed to the outer side, and it is then inserted into the cleft and the full thickness is wedged into the cavity.

The last two systems of grafting are intended to guarantee a certain prolongation of life to American grafts, if persons using them are desirous to grow shoots in a short time in utilizing the little vitality left in the French stocks diseased by the phylloxera, but which are still partially productive.

GRAFT BY APPROACH, MADE ON RIPENED WOOD.

This graft has not, up to this date, given many good results, and it is seldom used on account of the poor vegetation which follows after the graft is deprived of

its root. The grafts made by herbaceous approach (*approache herbacée*), though not much known, are recommended by Mr. Comy, of Garons (Gard), who has been very well satisfied with their use. They are made in the following manner: The first year a French cutting and an American one are planted side by side at a distance of about four inches of each other. The following year the eyes of the two plants (*saplings*) which are the nearest to the soil are covered with earth. Strong shoots grow from the plants, and two of these shoots, the most easy to be brought together, are selected. Then the American shoot is wedged off and a small incision made with a grafting knife on the French shoot (cutting, fig. 8). The former shoot is inserted into the cleft made in the latter, they are tied together, earthed up and finally the French shoot is pinched (*pincé*) at the place where the arms (*bras*) of the stock are to spread from.

The binding used by Mr. Comy is made of flat India rubber $\frac{14}{100}$ of an inch wide and from 2 to 2½ inches long. When it is not made too tight it allows the growth of the herbacious part without strangling. A few weeks after this work the graft is separated by cutting the French plant under its point of contact with the American stock.

CHAPTER V.

TOOLS AND GRAFTING MACHINES—TOOLS FOR CLEFT GRAFTING.

The tools used in cleft grafting are, 1st, a saw with an iron bow, or a common gardener's saw, to cut the stocks of large size; 2d, pruning shears for smaller stocks; 3d. a steel chisel similar to a cold chisel, or in preference, a chisel having the shape of the blade of a knife; this has the advantage of opening the stock more at the outside than at the center; 4th, a common hammer, or, in preference, a hammer with one side like a pick-axe; this is used to drive the chisel into the wood and to remove the earth from the stock which is to be grafted; 5th, a pruning knife to trim the graft, make the cleft on the young stocks and prepare the grafts.

SPECIAL TOOL USED FOR THE PONTOISE GRAFT.

For this graft an angular bladed gouge is often used to open the sharp-edged groove in which the graft is wedged.

GRAFTING INSTRUMENTS USED FOR CLEFT AND CHAMPIN GRAFTING.

Many instruments may be used to make these two kinds of grafts indoors; these may be seen at the Agricultural Fair, so I will not describe them to you.

CHAPTER VI.

FASTENING AND GLUEING.

Grafts made on stocks of small diameter must be strongly fastened with ligatures which keep tight up to the time when they are sufficiently joined together, cord and Japanese raphia (*raphia*) are more specially used for this purpose. The latter is cheaper and stronger, but it rots easily in wet seasons, but this can easily be overcome by bathing it in sulphate of copper for a short time before using it.

Wire has also been tried, but having little or no elasticity, it has the great inconvenience of strangulating the graft often before people think of removing it. It can only be used in cutting grafts as they do not grow much the first year.

Wool is often used in grafts made above ground, but is easily rotted by dampness when used in the ground.

The best preparation to enclose the graft and protect it so far, is prepared clay. A small quantity of it is applied on the graft to protect it from the contact of the air and water. The clay must be entirely free from gravel and consist in a well kneaded paste which will neither run nor crack when it is worked.

CHAPTER VII.

NECESSARY CARE TO BE GIVEN TO THE GRAFTS AND EARTHING UP (BUTTAGE.)

The graft once finished must be earthed up or staked. The earth, well prepared beforehand, is put around the graft forming a sort of a cone and allowing the last eye only to be above the ground. This work is done with a *tringue* or triangular hoe, and must be done carefully so as not to shake the graft.

REMOVAL OF THE FRENCH ROOTS AND AMERICAN SHOOTS.

It is necessary to examine the grafts about every twenty days, or every month during the summer, to destroy all the roots which have grown on the graft, and remove the suckers which start from the stock. The success of the grafts often depends on the careful manner in which this work is done; in fact, when the roots of the graft are allowed to grow, the vegetation of the graft bearer decreases and the outside part in the air grows quicker than the part in the ground. This abnormal growth causes the disjunction of the sides of the cleft and often occasions a complete separation of the graft.

A fact of this nature was observed this year in a vineyard near Montpellier, on a large quantity of *Herbemonts* grafted with *Aramons*, *Aspirans* and *Carignanes*, whereas, in an entire row, where the plants had been inspected with care, no accident of this kind was noticed. Besides, the freeing of the grafts is always injurious, as their roots are destroyed in a very short time by the phylloxera.

When the suckers are neglected to be removed, the chances are that they will increase to the prejudice of the buds of the graft. After the month of August, when the successful plants can be recognized, the cutting of the suckers is stopped, to keep a reserve if needed of shoots on which grafts can be made the following year. In case these second shoots should not be plentiful, it is almost always possible to make another graft on the lower part of the stock.

THE CALENDAR FOR GRAFTING.

January and February—Gathering and storing of the grafts; making of the grafts on cuttings and rooted stock; burial of the grafts in the sand.

March—Continuation of the latter work; beginning the field grafting.

April and first fortnight in May—Continuation of field grafting; planting of the grafts made indoors during the former months.

June and July—Inspection of the grafts for the removal of the roots and suckers. After the 15th of June begins the grafting by herbaceous approach of Comy.

August—Continuation of the inspection of the grafts. Reserve of the second suckers on the stocks on which the work failed in the spring; separation of the rooted end of the herbaceous grafts made in June.

September—Continuation of the work done in August.

APPENDIX.

Many vineyards near Montpellier have given very interesting results in grafting French stocks on American vines. Among these, viz.:

Mess. Pagezi, at Vivier, with *Aramons* on *Clintons.*

—— Julian, at Villeneuve; *Chasselas* on *Taylor.*

Mrs. Fabre, at St. Clement; *Aramon, Petit-Bouschet, Carignane, Chasselas, Joannenc* on *Riparia, Clinton, Taylor, Herbemont* and *Cunningham.*

Mess. Cancel, at St. Gely-du-Fesc; *Cinsaut* on *Clinton.*

—— De Turenne, at Vallotre, near Pignau; *Aramon* and *Carignane* on *Clinton, Taylor* and *Riparia.*

—— E. Courty, at St. Georges d'Orgues; *Aramon* and *Carignane* on *Clinton.*

—— Ferrouillat, at St. Georges; *Cinsaut, Oeuillade* and *Aspiran* on *Clinton.*

—— Des Hours, at Manguio; *Aramon* on *Clinton* and *Concord.*

—— Bouscaren, at the Terral; *Aramon, Cinsaut, Chasselas* on *Taylor* and *Clinton.* Grafts of different kinds.

—— Saint Pierre, at Rochet, near Castelnau; *Aramon, Petit-Bouschet* and *Cinsaut* on *Solonis* and *Clinton.*

—— Arnal, at Lavérune; *Aramon* and *Petit-Bouschet* on *Clinton.*

—— Vialla, at Saporta, near Montpellier; *Aramon* and *Carignane* on *Cunningham, Herbemont* and *Jacquez.*

—— Ernest Leenhardt, at the Chalet, near Montpellier; *Aspiran* on *Clinton, Carignane* on *Herbemont.*

—— Blouquier, at the Mas-de-Farel, near Manguio; *Aramon, Cinsaut* and others on *Concord.*

—— Sabatier, at Morin, near Montpellier; grafts of different kinds.

—— Gordon, at St. Georges; *Cinsaut* and *Aspiran* on *Clinton.*

—— Loubet, at Montpellier; different French stocks on *Clinton.*

—— Delon, at Labruyére; *Terret* and *Aramon* on *Clinton.*

APPENDIX J.

PORTUGAL AND AUSTRALIA.

[Translations and Abstracts made by Dr. J. I. Bleasdale, Secretary of the Viticultural Commission of California.]

PHYLLOXERA IN THE PORT-WINE PROVINCE OF PORTUGAL.

The effects of phylloxera began to appear, while the cause was unknown, in Portugal about the same time as in France. It was first observed in the parish of Gouvinhas, in the Commune of Sabrosa, District of Villa Real, in the very heart of the country which produces port wine. There, as has generally happened in other recent centers of infection, the damage done by it for the first few years was of no great consequence, but after a while it became extraordinary. In 1865 this property produced 7,000 gallons of wine, and in 1872 the yield was only 106 gallons!

At short intervals other places were observed to have been attacked, but without awakening the attention which the importance of the evil demanded. Consequently it is now impossible to denote step by step the course of its progress, while its spread has been extraordinary, and rendering at the same time the demarcation of all the numerous affected spots all but impossible.

However, the affected localities were confined to the vineyard districts of the Douro until 1878, the period at which spots were discovered where phylloxera had been at home a long while, in the Communes of Macedo and Mirandella belonging to the district of Braganza. On the map of Portugal the infected country extends from Villa Real and Alijo north to Lamego and San Joas da Pasqueira south, and the surrounding districts. As to the center part—the district of Sabrosa—it is utterly destroyed.

The produce of the Douro is now, June 1880, reduced to two-thirds, *i. e.*, by nearly 30,000 pipes; of money value, $1,000,000, and the corresponding capital disappears along with the vineyards.—*Reports of the Royal Commission for the Study and Treatment of the Vineyards of the Douro.*

After careful investigation into the extent and virulence of the attack, the Commissioners have decided to recommend carbon bi-sulphide as the only curative and protective remedy, and to accomplish those ends they, with aid from the Government, have established a factory for the manufacture of it on an extensive scale.

PHYLLOXERA IN VICTORIA, AUSTRALIA.

Three years ago phylloxera was discovered in a small vineyard near Geelong—the first established vineyard district of that State. As it was at that time confined to only one or two other small properties there was no difficulty about tracing its origin. Five years previously Mr. Dardell, the proprietor of the vineyard had paid a visit to France and brought back with him a small parcel of plants or cuttings. Thus the pest was introduced. No sooner was it ascertained to be the true *phylloxera vastatrix* than the Legislature, then in session, passed a stringent act for the suppression of it, giving power to quarantine and even to eradicate vines and destroy vineyards. But the administration of the act, and the exercise of the powers granted under it, were placed in the hands of the Secretary of the Department of Agriculture, and two proprietors of vineyards. The consequence has been, as might have been expected, that the Secretary had too much else to attend to, and the work of stamping it out was left to the other two Commissioners, themselves interested in vineyards.

Some remedies were tried for a time and failed. Then the ultimate means were had recourse to, and one vineyard at least, belonging to Mr. Wyatt, was rooted up. But still it spread to other vineyards, and continued to spread. At present a select committee of the Legislature is enquiring into the extent to which it has spread, and other matters affecting its development and arrest.

What is very interesting to the California vineyard proprietor is the fact, deposed to by both Mr. Wyatt, an intelligent and close observer, and the Secretary of Agriculture, Mr. A. R. Wallis, that on the rootlets of vines left in the ground when Mr. Wyatt's vines were uprooted, three years ago, the phylloxera was found so late as last November. These facts are reported among other depositions taken on the 24th of November by the committee of the Legislature. The carbon bi-sulphide is about to be tried as a curative measure in that State.

SESSIONS

OF THE

BOARD OF STATE VITICULTURAL

COMMISSIONERS.

SESSIONS OF THE BOARD.

MINUTES OF THE PROCEEDINGS OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS.

FIRST MEETING FOR ORGANIZATION, MAY 24TH, 1880.

The following named members of the Board of State Viticultural Commissioners, met at 2:15 P. M., May 24th, 1880, at the office of Mr. Chas. A. Wetmore (one of the members), No. 111 Liedesdorff street, San Francisco, for the purpose of organizing the Board:

ISAAC DE TURK, Commissioner for the Sonoma District.

CHARLES KRUG, Commissioner for the Napa District.

ARPAD HARASZTHY, Commissioner for the San Francisco District.

L. J. ROSE, Commissioner for the Los Angeles District.

R. B. BLOWERS, Commissioner for the Sacramento District.

GEO. WEST, Commissioner for the San Joaquin District.

J. DEBARTH SHORB and CHAS. A. WETMORE, Commissioners for the State at Large.

G. G. BLANCHARD, Commissioner for the El Dorado District, sent word that he was unable to attend, owing to a press of business engagements.

The meeting was temporarily organized by the election of Mr. L. J. ROSE, temporary President, and Mr. CHAS. A. WETMORE, temporary Secretary.

The Commissioners present qualified by subscribing to the oath of office; which oaths duly certified, the Secretary was subsequently instructed to forward to the Secretary of State.

Permanent officers were thereupon elected, as follows:

President—ARPAD HARASZTHY.

Vice-President—CHAS. A. WETMORE.

Treasurer—CHAS. KRUG.

The vote in each case was unanimous—no other nominations being made. The election for Secretary was postponed till next day.

Lots for the long and short terms were then prepared and each member present drew once, leaving the ninth lot for Mr. Blanchard—who was absent—as follows:

Commissioners for two years, viz:—Apard Haraszthy, R. B. Blowers, J. De Barth Shorb and Chas. Krug.

Commissioners for four years:—Geo. West, L. J. Rose, Isaac De Turk, Chas. A. Wetmore, and G. G. Blanchard.

The bond of the Treasurer was fixed at eight thousand dollars, ($8,000) to be signed by two sureties, who shall be freeholders in this State. The bond of the Secretary was fixed at fifteen hundred dollars, ($1,500) to be signed by two freeholders as sureties.

It was directed that these bonds should be made out in duplicate, and be transmitted to the Committee on Finance, when appointed, and after approval by said Committee, to be filed by the Executive Committee, one of each with the Secretary of State and one with the Secretary of the Board.

Mr. Shorb was appointed a Committee of One to confer with the officers of Wells, Fargo & Co., to ascertain what facilities the Board might obtain for transmission of samples of wines and other products for the use of the Board in San Francisco.

Mr. Wetmore was appointed a Committee of One to prepare a report upon the law under which the Board was appointed, defining its work and its duties.

The Board then adjourned until 11 A. M., May 25th.

SAN FRANCISCO, 25th May, 1880.

The Board of State Viticultural Commissioners met at 111 Leidesdorff street, pursuant to adjournment, at 11 A. M.

Present: President Arpad Haraszthy, Messrs. DeTurk, Krug, West, Rose, Blowers, Shorb and Wetmore. Absent—Mr. Blanchard.

The President presided, and Mr. Wetmore continued to act as Secretary *pro tem.*

Mr. Shorb reported favorable progress in the matter of transportation facilities. Mr. Wetmore reported concerning the duties of the Board, submitting notes for the consideration of the Commissioners.

The following named gentlemen were announced by the President as applicants for the position of Secretary, viz.: Dr. L. J. Morse, Ignacio Brown, Dr. T. A. Lockwood, J. Ward, Jr., Manuel Eyre and Rev. John I. Bleasdale, D. D., F. G. S.

By an unanimous vote, Dr. Bleasdale was elected Secretary. His salary was fixed at one hundred ($100) dollars per month.

The Secretary elect was then sent for. He appeared before the Board, accepted the office, and was at once installed.

The Secretary having taken his seat, the business of the Commission was proceeded with, and the following appropriations were made, viz.:

Salary of Secretary	$1,200	per year.
Rent of rooms	500	"
Furniture	400	"
Members' traveling expenses, according to law	210	"
Lectures	350	"
Phylloxera investigation, printing, stationery and incidental expenses.	1,340	"
Total	$4,000	

The first annual meeting of the Board of Commissioners was appointed to take place the second Monday in December, 1880, at 11 A. M.

In future the semi-annual meetings will be held on the second Monday in June, each year, and on the second Monday in December.

It was also decided to hold a special meeting in San Francisco on the second Monday in August next.

Other special meetings may be called by requisition, signed by any five members, to be held fifteen days from the date of such requisition; the business to be transacted at such special meeting to be specified in the notices sent to the Commissioners, and none other entered upon.

The bonds of the Treasurer and Secretary were directed to be filed with the State Treasurer, at Sacramento.

COMMITTEES APPOINTED.	(MEMBERS OF.)
Executive:	CHAS. A. WETMORE, GEO. WEST, ISAAC DE TURK.
Auditing:	R. B. BLOWERS.
Finance:	LOUIS J. ROSE AND J. DE BARTH SHORB.
Phylloxera, Vine Pests and Diseases of Vines:	I. DE TURK, GEO. WEST, CHAS. KRUG, R. B. BLOWERS.
Conference with Board of Regents of the State University:	A. HARASZTHY, CHAS. A. WETMORE AND CHAS. KRUG.

Duties of the Executive Committee—To exercise a general supervision over the work of the Commission; to select rooms and furniture; to select lecturers and pay them as directed by the Commission.

Finance—To examine accounts of Treasurer.

Auditing—To audit all accounts.

No committee to contract debts, except as directed by the Board.

The Board was informed by a communication from the Secretary of the Board of Regents of the State University, that the following named Regents had been appointed a special committee, on behalf of the University, to co-operate with the Board of Viticultural Commissioners: Hon. B. B. Redding, Hon. H. M. La Rue, John L. Beard, Esq., and Hon. John Bidwell.

Duties of District Commissioners.

They shall each report annually upon viticulture in their respective districts, as they may deem best for the promotion of viticultural industries, which reports shall include district statistics. Each report shall be prepared for publication in the name of the Commissioner who is its author, and shall contain a statement of the results of his experience and research, together with his recommendations and advice,

Each district Commissioner shall determine the times and places for holding viticultural meetings in his respective district, with full power to hold one or more, as he may think best, and shall report such times and places to the Executive Committee one month before holding the same, so that due public notice may be made throughout the State. The special subjects to be discussed at such meetings shall be stated in advance, and due notice given to the public.

They shall have power to hold local viticultural fairs and exhibitions at their discretion, and shall preside over or appoint a substitute to preside over all such district meetings and fairs.

They shall endeavor to enlist experienced viticulturists and experts in the work of imparting information; shall preserve as much as possible all important communications, addresses and documents for the use of the Board, and shall transmit, whenever possible, copies of printed addresses, lectures and documents relating to viticulture to the Executive Committee.

They should assist in organizing local viticultural societies, whenever practicable in their judgment, and endeavor to promote harmonious relations between such societies throughout the State, and secure their active co-operation with the State Board of Commissioners.

They shall also make known to members of the State Legislature, members of Congress, United States Senators and United States Revenue officers residing in their respective districts, the wants of viticultural industries.

No district Commissioner shall contract any debts or liabilities for which this Board shall become responsible, unless duly authorized to do so.

Duties of Commissioners for the State at Large.

They shall report annually at the same time required of district Commissioners, on topics of general interest to viticultural industries, and especially concerning the uses and abuses of wines and spirits, transportation, and general legislation; and shall arrange for the collection and analysis of wines and spirits, domestic and foreign, and report concerning adulterations and means for preventing the same.

PHYLLOXERA AND VINE PESTS.

The Committee on Phylloxera, Vine Pests and Diseases of the Vine, was instructed to institute special inquiries and investigations, with the aid of assistants in the fields of observation.

The matter of publishing a series of text books, or pamphlets, giving elementary instructions in viticulture was postponed until the next meeting.

It is anticipated that assistance in procuring accurate statistics may be obtained through the Enumerators for the Census and the County Assessors. The intention is to prepare charts of the State, showing the exact location of all the vineyards now planted, and so colored as to indicate qualities of soils, and adaptation of different districts for viticulture.

OFFICE OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS,
SAN FRANCISCO, 9th August, 1880.

A special adjourned meeting of the Board of State Viticultural Commissioners was held on August the 9th and 10th, at the new offices in this city, No. 526 Montgomery street, at two o'clock, P. M.

PRESENT: Arpad Haraszthy, Esq, President; R. B. Blowers, Isaac De Turk, Chas. Krug, Geo. West. L. J. Rose, Chas. A. Wetmore, and the Secretary, Dr. John I. Bleasdale.

ABSENT: Commissioners Shorb and Blanchard.

A review of the work of the standing and special Committees was presented for approval.

The Special Committee on Phylloxera, Vine Pests and Diseases of the Vine, reported progress, the substance of their initiatory proceedings at Sonoma having already been made known.

Mr. Wetmore reported that he had, in conjunction with Professor Hilgard of the State University, selected Mr. F. W. Morse of the University, to proceed to the different vine-growing sections, and to report simple data, based on observation, inquiry and experiment concerning vine diseases, for the consideration of the Board and Professor Hilgard. He is to report simple facts for the use of the Board and the University. His attention is directed not to phylloxera alone, but to all oidium, black knot, thrip and other diseases and pests.

By request of the Chairman of the Committee on Phylloxera, Vine Pests, &c., Mr. Wetmore was added to the Committee, and was instructed to obtain by correspondence a statement of the best methods of resisting the phylloxera, known in France, and especially the cost and method of applying the sulphide of carbon; also, the cost and methods of manufacturing the same; also, samples of implements used in applying the sulphide.

Letters were read addressed to Messrs. West and Wetmore, from Stockton, relative to the practicability of obtaining seeds and plants of the Cuhach (pyrethrum cinevarie folium) to cultivate in vineyards, as an additional protection against insects. It seemed to the Commission practicable to obtain and cultivate the plants.

The Commission then adjourned to 10 A. M., next day.

On the following day, 10th August, the Board assembled at 10 A. M.

COMMISSIONERS PRESENT: Chas. A. Wetmore, Vice-President, presiding, L. J. Rose, I. De'Turk, R. B. Blowers, Geo. West, and later A. Haraszthy.

RESOLUTIONS ADOPTED.

On motion by Mr. Rose, the following resolution was unanimously adopted, after considerable discussion:

Resolved, That it is the belief of the Viticultural Commission that it is of the first importance to maintain the purity of our wines and brandies, and to make the matter as self evident as possible throughout our country, and in view of this fact it is the sense of this Commission that an important step in this direction would be taken, if it were a requirement of the Internal Revenue Department that all brandies made from grapes and other fruit in the United States should be sold in original packages, with the tax paid stamps attached, and that all law permitting the sale of fruit brandies under a rectifying or wholesale liquor dealer's license be repealed; also, that it be permitted to have five-gallon packages, and that tax stamps be issued for this purpose. That our Representatives and Senators of this State be asked to help us to secure the passage of such laws and regulations as will carry out these changes; also, that it is desirable to have a distinctive color for stamps for

brandy made from grapes. That all grape-growers and distillers be asked to aid in this matter by signing a petition to Congress; also, that it is of vital importance that all grape and fruit brandies be permitted under existing regulations to be entered for storage, and be moved from one to another of any of the bonded warehouses ih the United States; provided that this shall not interfere with the present system of special warehouses.

On motion of the President, and seconded by Mr. Rose and carried,

Resolved, That the Treasurer be instructed to pay to the Chairman of the Special Committee on Phlloxera, Vine Pests and Diseases of the Vine, the sum of one hundred and fifty dollars ($150), to be used by said committee in defraying expenses of their investigations in the field, not including any personal expenses of said committee.

On motion of Mr. Rose, seconded by Mr. Blowers,

Resolved, That the Treasurer be instructed to pay to the Chairman of the Executive Committee the sum of fifty dollars ($50), to be used in defraying contingent expenses of the committee and of the general office of the Board, not including any personal expenses of any member of the committee.

On motion of Mr. DeTurk, seconded by Mr. West,

Resolved, That the thanks of this Board are tendered to Dr. Hermann Behr, for his able and instructive lectures on the Phillоxera, delivered at the Sonoma District Viticultural meeting, held on the 23rd July at Sonoma, and it is the intention of the Board to preserve the same for future publication.

On motion by Mr. L. J. Rose, seconded by Mr. Chas. A. Wetmore,

Resolved, That the thanks of this Board be tendered to our Secretary, Dr. J. I. Bleasdale, for his contribution of the use of his laboratory and scientific works and instruments in furthering the work of his office.

On motion by Mr. West, seconded by Mr. Krug,

Resolved, That the following should in future be the order of transacting business at the meetings of the Board, viz:

1.—Roll call.

2.—Reading of Minutes.

3.—Reports of Standing Committees.

4.—Reports of Special Committees.

5.—Correspondence.

6.—New Business.

7.—Unfinished Business.

On motion by Mr. Krug, seconded by Mr. Blowers,

Resolved, That the Commission request the Board of Regents of the State University of California to assist them in the matter of investigating Phylloxera, &c., and to that end allow Prof. Hilgard a sum similar, in amount to that allowed by the previous resolution of the Commission, viz: $150.

SEMI-ANNUAL MEETING OF THE STATE VITICULTURAL COMMISSION.

The semi-annual meeting of the Board of State Viticultural Commissioners was held on the 13th December, at their office in San Francisco, No. 526 Montgomery street; the following members being present:

Arpard Haraszthy, President; I. De Turk. R. B. Blowers, George West, L. J. Rose, G. G. Blanchard, and Chas. A. Wetmore.

ABSENT: Chas. Krug and J. De Barth Shorb.

Reports were submitted by the following Commissioners, viz.: Chas. A. Wetmore, Chairman of the Executive Committee; by I. De Turk, Chairman of the Committee on Phylloxera, Vine Pests and Deseases of the Vine; also, by Messrs. Haraszthy, Blowers, De Turk, and Rose, for their respective Districts.

The Phylloxera Committee's report was voluminous, and contained matter of original research and full abstracts and translations from French reports. It was ordered printed.

In consequence of the limited funds for printing and publishing the report of the Commission, it was resolved that only 2,000 copies should be printed for the use of Members of the Legislature, and distribution by the Board. A Printing Committee, consisting of Messrs. Haraszthy, Wetmore, and De Turk, were appointed to superintend the printing of the Report.

The resolution of last meeting offered by Mr. Commissioner Rose, and passed relating to stamps on brandy, was amended by an addition, as follows:

That parties placing brandy made from grapes in any bonded warehouse be allowed, under proper regulations, and under the supervision of the keeper of the bonded warehouse, to fill smaller packages out of larger ones, and that such packages shall have the tax-paid stamps attached the same as the original packages.

It is, however, understood that as much revenue shall be paid as would be required if the re-filling of small packages had not taken place, and that all expenses be defrayed by the owner of the brandy.

Moved by Mr. Rose, seconded by Mr. Blanchard; *Resolved*, that the following Commissioners form a Committee on Legislation, viz.: Messrs. West, Rose, Blowers, Wetmore, De Turk, and Blanchard, any two to form a quorum.

JOHN I. BLEASDALE,
Secretary.